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Volume 20 August 1951 Number 8

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This magazine is published to promote sound thought concerning industrial medicine and the surgery of trauma. To that end it will contain articles, news items, reports, digests, and other presentations, together with editors' comments. The editorial policy is to encourage frank discussion. On this basis contributions are invited. The editors will exercise care in checking on the accuracy of data printed but in all other respects articles and opinions of which expression is allowed are the opinions of their authors—the editors reserving in all cases the right to comment on the same in the current or any subsequent issues as they may be inclined.

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INDUSTRIAL MEDICINE AND SURGERY, The Journal of Medicine in Industry: Entered as second class mail matter August 28, 1941, at the Post Office at Chicago, Illinois, under the Act of March 3, 1879. Reentered, October 3, 1949. Additional entry at Sheboygan, Wisconsin. Published on the fifth of each month by INDUSTRIAL MEDICINE PUBLISHING COMPANY, Chicago (publishers also of AMERICAN INDUSTRIAL HYGIENE ASSOCIATION QUARTERLY). STEPHEN G. HALOS, President; A. D. CLOUD, Publisher; CAREY P. McCORD, M.D., Consultant Editor; JEAN SPENCER FELTON, M.D., Editor; HAROLD A. HOOPER, Treasurer; DORIS FLOURNOY, Editorial Assistant; STEPHEN G. HALOS, Advertising and Business Manager. Member, Audit Bureau of Circulations. PUBLICATION, EDITORIAL and EXECUTIVE OFFICES, 605 North Michigan Avenue, Chicago 11, Illinois. Subscription $6.00 per year in the United States; $6.50 (U. S. Currency) per year in Canada; $7.00 (U. S. Currency) per year in other countries. Single copies 75 cents. Title Registered in United States Patent Office. Rd. Canada, 1942. Copyright, 1951, by Industrial Medicine Publishing Company, Chicago. CHANGE OF ADDRESS: FOUR weeks' notice required; changes cannot be made without old address as well as new; please furnish postal zone number for new address if city requires it.

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THIS ISSUE

THE "20-odd medical specialties" represented in the membership of the "National Doctors Committee" (page 376) were listed in last month's Journal (*Indust. Med. & Surg.*, 20:7, 36 (July) 1951). Industrial medicine is not given as one of the specialties, but the Chairman of this Committee of specialists is DR. ROBERT COLLIER PAGE, General Medical Director of Standard Oil Company (New Jersey), and Second Vice-President of the Industrial Medical Association.... THE OFFICERS and Directors of the Industrial Medical Association whose portraits appear on pages 379 and 380 are identified, as to company affiliation, on page 4. It is planned in an early issue to introduce the Association's District Counsellors in the same manner, and then to follow with the Committee Chairmen.... THE EDITORIAL on page 383 is the opener of a series which will treat of "The Stature of Industrial Medicine." It is expected that some of the comments to be made and the questions to be asked in the successive installments will stir up controversy. One of the questions already has been answered by the Ramazzinians, in their definition of industrial medicine (page 382): "Industrial medicine is the inquiry into, and the application to industrial workers and their work environments of, all the good deriving from the biologic and social sciences, for the benefit of these workers, their industries, and their communities." That is a long way from the concept, which lingers in too many medical minds, that industrial medicine is only the curative treatment of the man in overalls, and must not be even thought about save by the general practitioner. "According to the A.M.A.'s 1950 directory, 47% of physicians do general practice." And, according to a survey by the Academy of General Practice, 94% of general practitioners do industrial medical work. That would mean that about 88,000 general practitioners are practicing industrial medicine. But are they? What is *their* definition of industrial medicine? The pursuit of this inquiry will be extremely interesting....

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PERSONAL

ALBERT RIVES SHANDS, JR., M.D., Medical Director of the Nemours Foundation and Surgeon in Chief of the Alfred I. du Pont Institute, of Wilmington, Delaware, has been named a member of the Armed Forces Medical Policy Council effective July 1, 1951. DR. SHANDS has been a civilian medical consultant to the Surgeons General of the three services. He is a graduate of the University of Virginia's Medical School; a former Professor of Surgery at Duke University; now a visiting Professor in Orthopedic Surgery at the University of Pennsylvania. During World War II, he served as a colonel in the U.S. Army Medical Corps, and continues to hold that rank in the Organized Reserve Corps. He is an international authority on orthopedic surgery.

CAREY P. MCCORD, M.D., at the meeting of the A.M.A. at Atlantic City in June, was elected Chairman of the Section on Preventive and Industrial Medicine and Public Health. VLADO A. GETTING, M.D., Health Commissioner of Massachusetts, was elected Vice-Chairman, RUTHERFORD T. JOHNSTONE, M.D., of Los Angeles, as Delegate to the House, and PAUL A. DAVIS, M.D., of Akron, Ohio, as Representative to the Scientific Exhibit. JEAN SPENCER FELTON, M.D., will continue for another year as Secretary of the Section.

THE 1951 Annual Meeting of the Ambulatory Fracture Association will be held October 8-11, 1951, at the Arrowhead Springs Hotel, San Bernardino, California. H. W. WELLMERLING, M.D., is Secretary-Treasurer of the Association. His office is at 626 Griesheim Building, Bloomington, Illinois.

DALE C. CAMERON, M.D., Bethesda, Maryland, former Assistant Director of the National Institute of Mental Health, has been appointed Chief of the Cooperative Health Services Branch of the USPHS Division of Industrial Hygiene; and CHARLES LANE NEWBERRY, M.D., who has been in the Office of Vocational Rehabilitation for the past five years, has been made Special Assistant to the Chief of the

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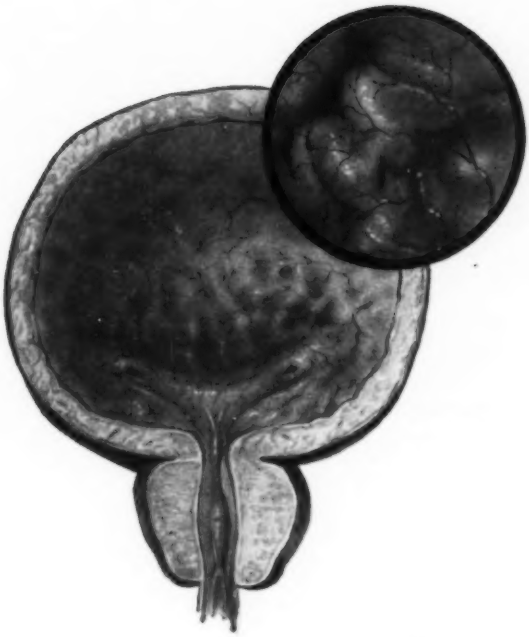

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Douglas, R. G.; Ball, T. L., and Davis, I. F.: California Med. 73:463 (Dec.) 1950.

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ARBIE LEROY BROOKS, M.D., 61, died at Pontiac, Michigan, July 12, 1951. He was being treated at Pontiac General Hospital for an acute heart condition which developed June 24. DR. BROOKS was born in Wisconsin in December, 1889. He graduated from the University of Wisconsin in 1924; received his medical degree at the University of Colorado School of Medicine in 1928; and interned at Henry Ford Hospital, Detroit. In 1929 he was appointed Medical Director of the Fisher Body Division—Cleveland, where he served until 1934 when he was made Medical Director of the entire Fisher Body Division. In 1948 he was transferred to the Fisher Body Division—Flint, and in January, 1950, he became Medical Director at Fisher Body—Pontiac. He was a member of the Oakland County and Michigan State Medical Societies, the Industrial Medical Association, the American Industrial Hygiene Association, the American Public Health Association, and the Industrial Physicians Club of Detroit. He was the author of numerous published papers on industrial medical subjects. Liked and respected by his many friends, DR. BROOKS was a wise counsellor and a fine doctor. His care of the injured employee was in the best tradition of the medical profession, and his ability in his chosen field of industrial medical practice was widely recognized.

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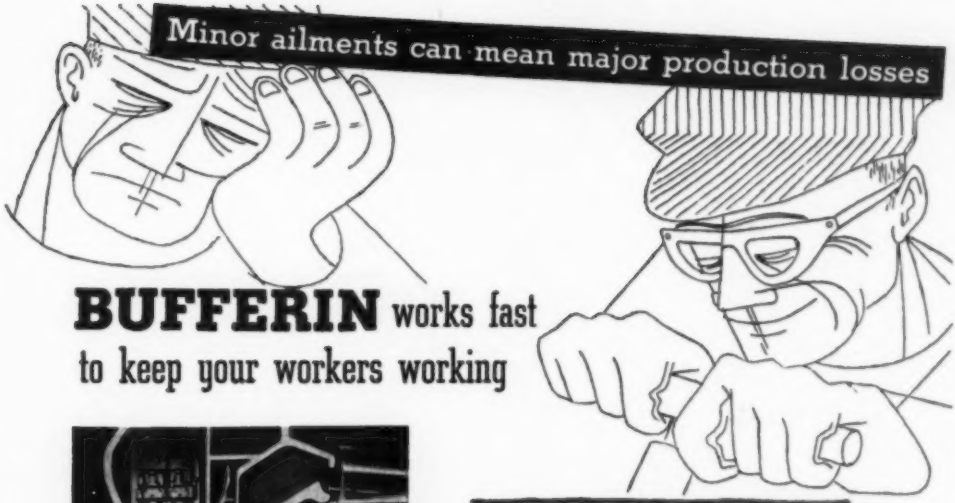

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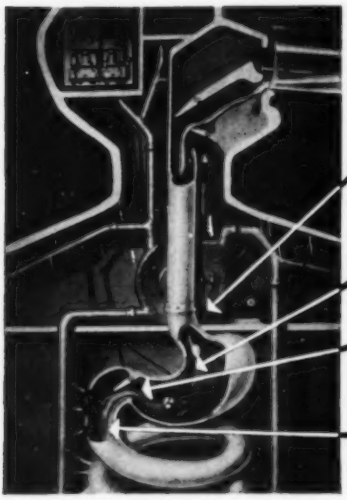

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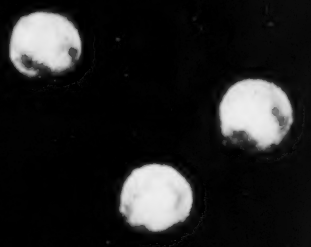

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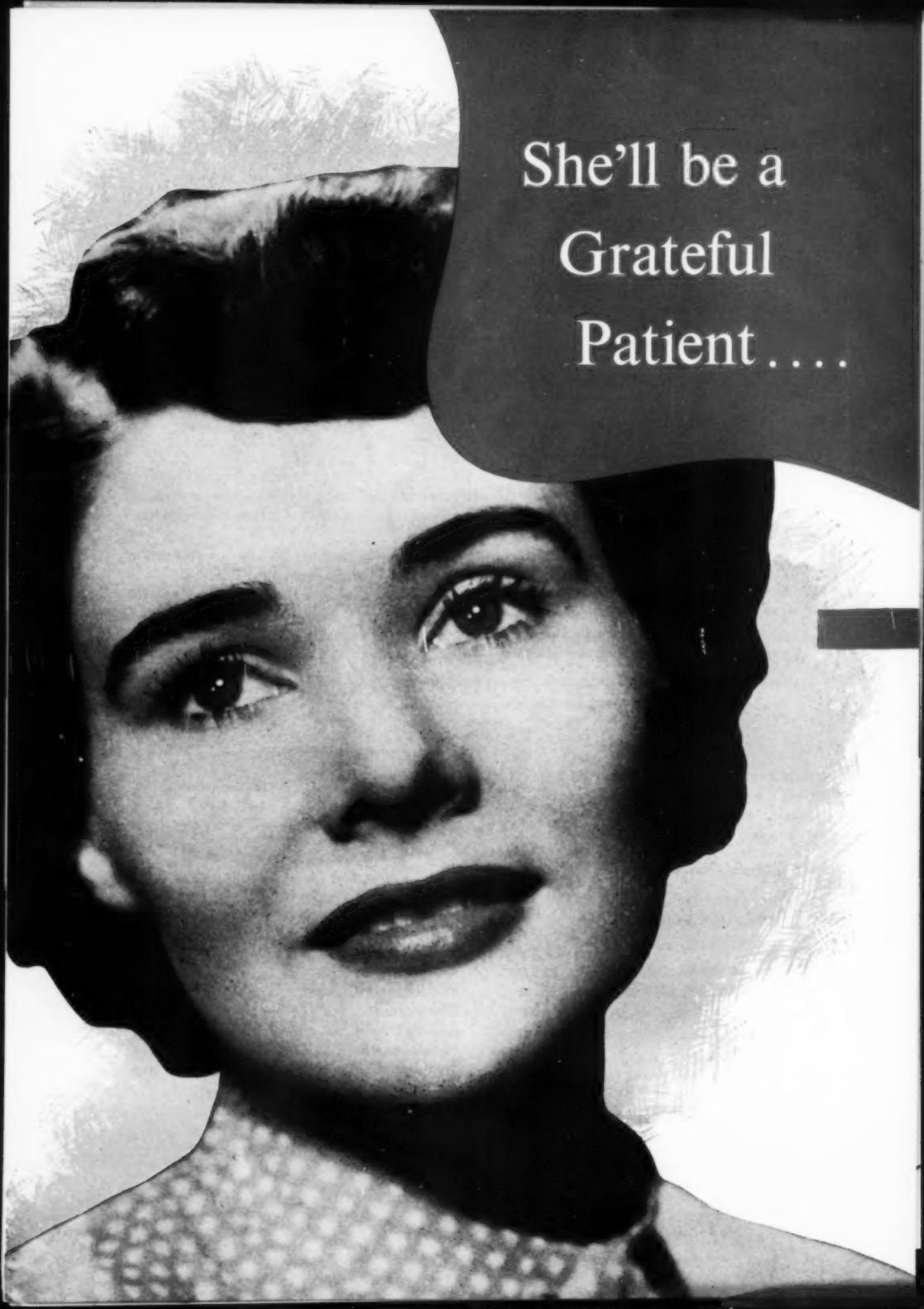
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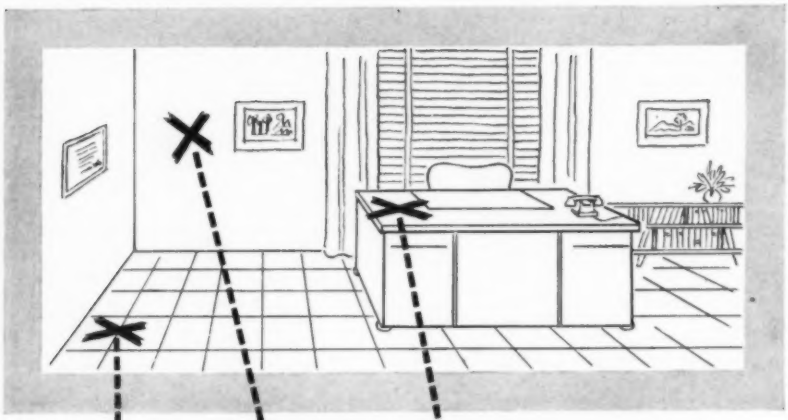

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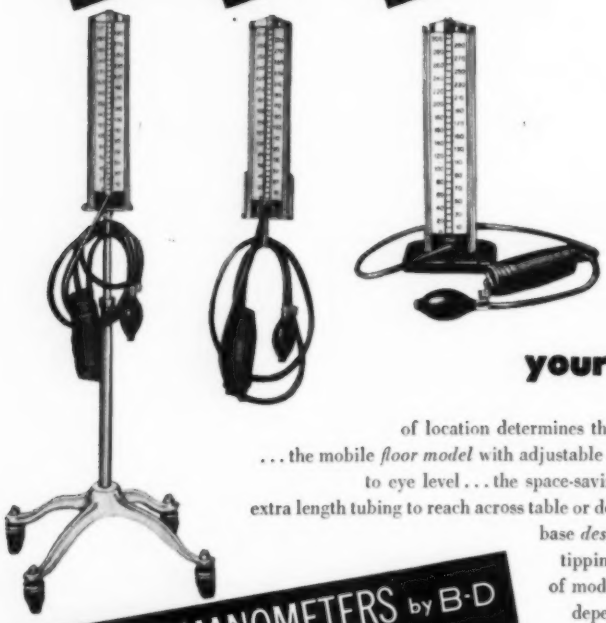
wall

desk



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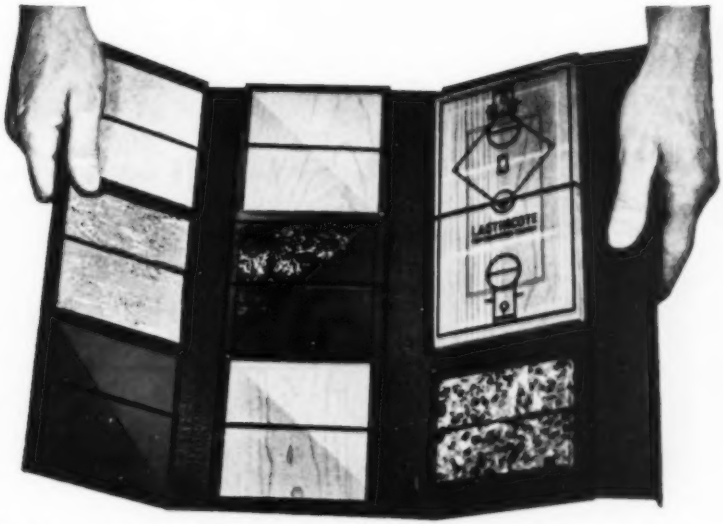

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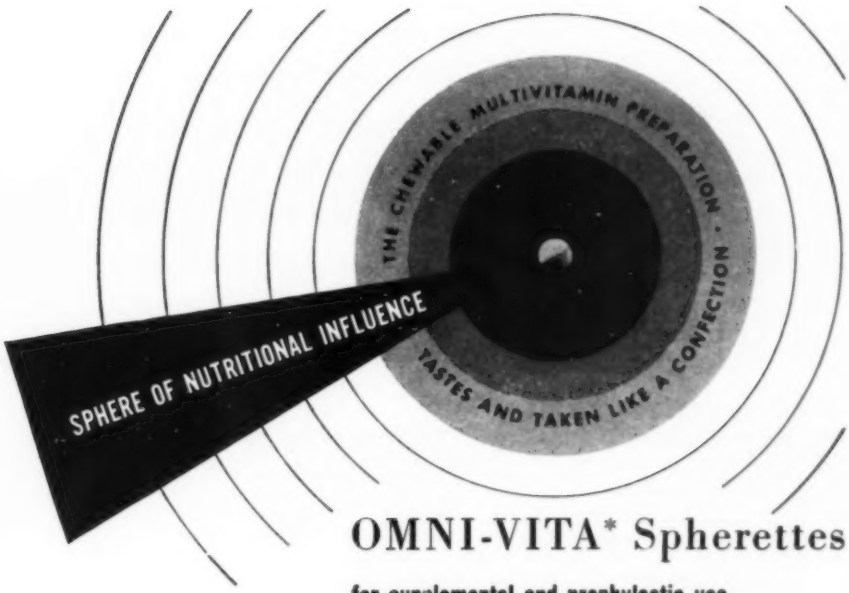

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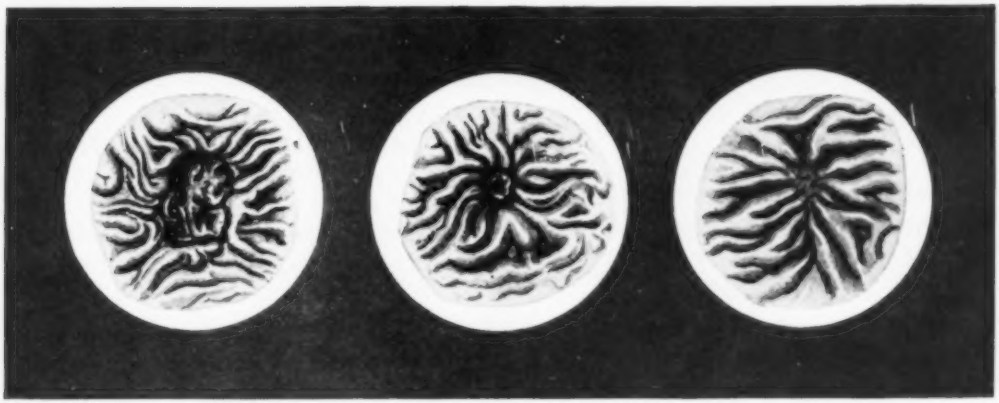

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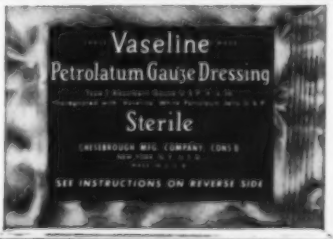

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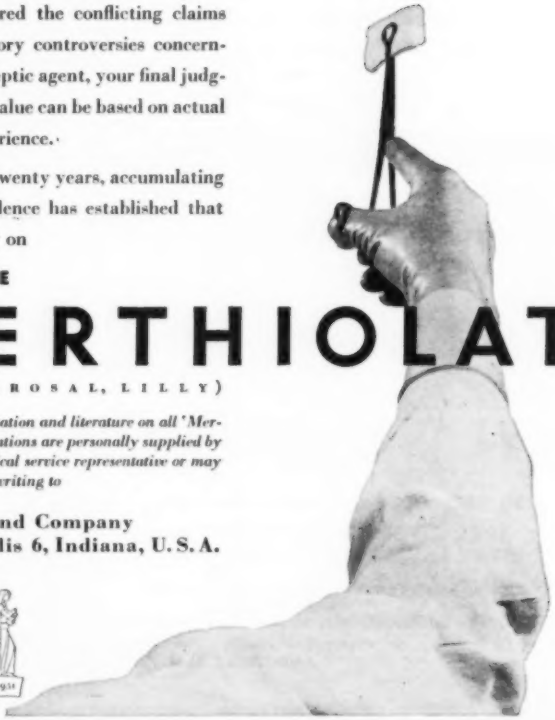

INDUSTRIAL MEDICINE AND SURGERY
The Journal of Medicine in Industry
With which are consolidated "The Industrial Doctor" and "International Journal of Medicine and Surgery"

Volume 20 AUGUST 1951 *Number 8*

Occupational Diseases Transmitted via Contact with Animals and Animal Products

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State of California Department of Public Health

PERHAPS Jenner never heard of Ramazzini. But his epic discovery of the immunity to smallpox conferred by the occupational disease, cowpox, indicated the great doctor was conscious of the need to ask his patient, "Of what trade are you?"

Jenner also was aware of the association of other animal diseases with man, as evidenced by the following opening paragraphs from his classic report, "An Inquiry into the Causes and Effects of the Variolae vaccinae":

"The deviation of Man from the state in which he was originally placed by Nature seems to have proved to him a prolific source of diseases. From the love of splendour, from the indulgences of luxury, and from his fondness for amusement, he has familiarised himself with a great number of animals, which may not originally have been intended for his associates.

"The Wolf, disarmed of ferocity, is now pillowed in the lady's lap. The Cat, the little Tyger of our island, whose natural home is the forest, is equally domesticated and caressed. The Cow, the Hog, the Sheep, and the Horse, are all, for a variety of purposes, brought under his care and dominion."[1]

While industrial hygienists are chiefly preoccupied with the dusts, fumes, gases, and vapors, the group of occupational diseases transmissible via animal contact tends to be neglected. However, examination of the problem reveals it is no insignificant one. It offers rich possibilities for epidemiological research and preventive medicine.

Most diseases of animals transmissible to man may be acquired occupationally. For the purpose of this review we have selected for major consideration those conditions which are most important in the United States by virtue of incidence and volume of disability caused: brucellosis, Q fever, anthrax, leptospirosis, and diverse skin affections. These will be discussed primarily from the point of view of epidemiology and prevention. We have omitted from consideration the many diseases such as Rocky Mountain spotted fever and relapsing fever which are transmitted from animals to man via insect vectors.

Table 1 indicates the incidence of reported diseases in California attributed to direct contact with animals and their products.

Brucellosis

IN TERMS of incidence and volume of disability caused, brucellosis, or undulant fever, is the leading occupational disease transmitted via animal contact in the United States today. A review of the available literature and other data indicates that: (1) the disease probably occurs more often as a result of contact with animals and animal products than it does from ingestion of infected milk; (2) it is probably more often occupational in origin than non-occupational; and (3) it has a higher attack rate among urban meat handlers than is found among rural farm workers.

Etiology

THE BRUCELLA organisms are of three types: melitensis (caprine or goat), abortus (bovine or cow), suis (porcine or pig). All can cause human illness, although the species differ in cultural and metabolic characteristics and in severity of disease produced. Furthermore, all three species may infect different animals and cross-infection between the animals occurs. The animal hosts of greatest importance to man are cattle, hogs, goats and sheep. However, the animal spectrum is broad and infections have been found or experimentally produced in horses, dogs, guinea pigs, rabbits, buffalo, deer, wild rats, barnyard fowl, monkeys, mice, hamsters, pigeons, and other animals. It has also been found that flies and ticks may be infected.[2,83]

TABLE 1.
REPORTED CASES DUE TO OCCUPATIONAL CONTACT WITH ANIMALS AND ANIMAL PRODUCTS
CALIFORNIA, 1949-1950

DISEASE	Total	1949 Number: Reported to Department of Industrial Relations	1949 Number: Reported to Department of Public Health	1949 Number: Total	1950 Number: Reported to Department of Industrial Relations	1950 Number: Reported to Department of Public Health	Total 1949 and 1950
Total	340	296	44	294	257	37	634
Infective and Parasitic Diseases	*87*	*49*	*44*	*75*	*38*	*37*	*158*
Brucellosis	55	17	38	50	18	32	105
Q Fever	9	9	—*	13	13	—*	22
Psittacosis	3	—	3	3	—	3	6
Leptospirosis	1	—	1	1	—	1	2
Anthrax	3	1	2	1	—	1	4
Exposed to Anthrax[1]	8	8	—	—	—	—	8
Exposed to Rabies[1]	4	4	—	7	7	—	11
Skin Diseases	*250*	*250*	—	*218*	*218*	—	*468*
Cowpox	2	2	—	2	2	—	4
Erysipeloid	1	1	—	8	8	—	9
"Fish poisoning"	27	27	—	23	23	—	50
"Meat poisoning"	—	—	—	4	4	—	4
"Turkey poisoning"	11	11	—	2	2	—	13
Other[2]	209	209	—	179	179	—	388
Diseases of the Lung of unspecified etiology	2	2	—	1	1	—	3
Diseases of the Eye	5	5	—	—	—	—	5

1. These are not diseases but only exposures which were reported.
2. Many of these are dermatoses from contact with fish, meat or poultry but are not specifically designated as a "poisoning."
*This disease is not notifiable in California.

Source: State of California, Department of Public Health, Morbidity Records; and Department of Industrial Relations, Doctor's First Report of Work Injury. Statistics compiled by Department of Public Health, Bureau of Adult Health.

Portal of Entry

BOTH experimental and epidemiological studies have established that the most common portal of entry is through the injured skin. There is some possibility that the organism may enter even through the intact skin. The gastro-intestinal tract is probably the next most important portal. The respiratory tract and the conjunctivae are other important possible portals, of importance particularly in industry. Brucella can be transmitted to man via (1) contact with the infected animal tissues, blood, secretions, products of abortion; (2) ingestion of contaminated milk, cream, cheese and dairy products; (3) air-borne infections by dust or droplets; (4) blood transfusion; and (5) the extremely rare possibilities of inter-human infection via coitus and maternal milk.[2,4]

Occupational Incidence

NUMEROUS studies have been done in this country, of which the Minnesota and Iowa work is perhaps the most complete.[3,5,6,7,8] These studies indicate that most cases occur in males. That this is because of greater occupational exposure of males is demonstrated by the facts that where exposure is other than through animal contact, the sex incidence is equal, and also that the age incidence in males is preponderantly in the adult working years while in females the distribution is almost uniform throughout all age groups. In a study of 268 proved cases of brucellosis in Minnesota it was demonstrated that at least 60% were occupational in origin. Farmers constituted the largest group of cases, with meat-packing workers a close second. However, in the proportion of these occupational groups to the entire population it is evident that the rate of infection is far greater in packing-plant workers than in any other occupation, with the exception of veterinarians.

The Minnesota studies[5] covering all cases reported from 1927 to 1947 demonstrated the following: (1) There has been an increase in human and bovine brucellosis since the period prior to World War II. (2) *Brucella abortus* is the most common cause of brucellosis in Minnesota. However, it was shown that while the major animal reservoir in this state is cattle, swine constitute the chief reservoirs of *Brucella melitensis* and *suis* and together accounted for almost 15% of the human cases. These cases also are relatively more severe than those caused by *B. abortus*. It is also recognized that the *suis* variety may spread from infected swine to dairy cattle on the same farm. (3) Half of all cases occur in occupations in contact with livestock or slaughtered animals, and three-quarters of all cases have some contact with farm animals. (4) Most cases occur among adult males between the ages of 20 and 55. (5) Raw milk was the sole source of disease in only 25% of all cases, and in these cases the male and female incidence was equal. (6) Infection is more common through the skin than via ingestion of milk or dairy products.

The Iowa studies[6] demonstrate essentially the same findings. In analysis of more than 2,000 cases of brucellosis it was shown that nearly 95% occurred among male farm workers and packinghouse employees. The remaining 5% comprised veterinarians, miscellaneous handlers of livestock, retail butchers, employees of locker

TABLE 2.

HUMAN BRUCELLOSIS IN IOWA, 1940-1947
Specific Morbidity Rate per 100,000 in Certain Occupation Groups Exposed through Contact with Animals, Contrasted with the Rate per 100,000 in the "No-Contact" Group

OCCUPATION	No. Cases 1940-47	Average Ann. Cases	Total Exposed to Risk	Specific Rate per 100,000
Veterinarians (including assts.)	36	4.5	800 (a)*	562
Packing house employees	442	55.2	20,000 (b)*	276
Male Farm workers	1,480	185.0	311,776 (c)*	59
"No-Contact" group 1940-46	601	45.2	2,336,492 (d)*	2

*(a) Approximate number in Iowa; (b) estimated number; (c) male farm workers, census 1940; (d) total population exclusive of (a), (b), and (c).

Source: Jordan, C. F., *The Epidemiology of Brucellosis*. Symposium, National Institutes of Health, Bethesda, Md. 1949.

TABLE 3.

BRUCELLOSIS IN THE MEAT PACKING INDUSTRY 1940-1946

Department and Type of Work	No. of Cases	Per Cent of Total
Killing floor (hog, 159; beef, 20; sheep, 9; shacklers, 3; not stated, 1)	192	52.6
Meat trimming	57	15.6
Skilled tradesmen (Machinist, 11; electrician, 4; carpenter, 4; plumbers, 3)	22	6.0
Casings and offal	19	5.2
Veterinary lay inspectors	16	4.4
Condemned meat—tankage	13	3.5
Hides	9	2.5
Live hogs in yards	9	2.5
Cooling room	7	1.9
Office work	4	1.1
All others	17	4.7
Total	365	100.0

Source: Jordan, C. F., *The Epidemiology of Brucellosis*. Symposium, National Institutes of Health, Bethesda, Md. 1949.

and rendering plants, etc. Their table (Table 2) shows that the highest specific morbidity rate occurred among veterinarians, with the next highest rate among packinghouse employees. The risk of infection and morbidity among packinghouse workers is shown to be nearly five times as great as that in male farm workers and over 100 times greater than among those of the urban population who have no contact with livestock. Again their findings confirm that skin contact is the most important portal of entry, for although nearly all farm residents are accustomed to drinking raw milk and cream, the fact that approximately 75% of the rural patients are male farm workers emphasizes the role of direct contact which allows the Brucella germ to invade the human body through the skin. The Iowa workers postulate the possibility that friction which attends the seizure of struggling animals plays an important part in forcing the causative organisms through the skin. Casual contact with animals is probably insignificant compared with the close contact which attends such special procedures as butchering, handling of new-born pigs, castration, and marketing of hogs.

The Iowa investigators made a special study of 365 records of packinghouse workers covering

TABLE 4.

REPORTED CASES OF BRUCELLOSIS[1] BY OCCUPATION CALIFORNIA, 1949-1950

OCCUPATION	Total	1949	1950
Total	266	141	125
Farming	49	27	22
Cattle	9	6*	3
Dairy	31	16	15
Hogs	6	2	4
Not specified	3	3	—
Creamery workers	4	1	3
Meat handlers[2]	43	22	21
Veterinarian	6	2	4
Laboratory worker	3	3	—
Housewife	55	30	25
Children under 15	21	8	13
Other (electricians, mechanics, salesmen, etc.)	63	36	27
Not stated	7	4	3
Histories not received	15	8	7

1. Reports of 231 cases obtained from morbidity records; reports of 35 cases obtained from Doctor's First Report of Work Injury.

2. This group includes meat packers, cattle auctioneers, butchers, meat inspectors and slaughterhouse employees.

*Among the farmers dealing in cattle, two also had hogs.

Source: State of California, Department of Public Health, Morbidity Records; Department of Industrial Relations, Doctor's First Report of Work Injury. Statistics compiled by Department of Public Health, Bureau of Adult Health.

the period 1940-46, with reference to distribution of cases according to department and type of work in the plant. Their findings are shown in Table 3. It will be observed here that although morbidity from brucellosis occurs among employees of many, if not all, departments, relatively more cases develop in the "kill and cut" departments, where workers are in daily contact with fresh tissues of hundreds or even thousands of animals at the time of slaughter. Brucella organisms may possibly be widely disseminated not alone on floors but on walls at hand level, on bannisters, in elevators, and elsewhere. "Might not this factor account for infection and illness which now and then overtake the white-collar worker in the same environment?" query the authors.

Confirmation of these findings is found in an analysis of 266 cases for the years 1949 and 1950, reported to the California State Department of Public Health and the California State Department of Industrial Relations (Tables 4, 5). Of this number, 105 gave clear-cut histories of occupational contact, and 76 are listed as either housewives or children under the age of 15. For the remaining 85 information was inadequate to determine whether or not occupational contact was present. More than 65% of the cases occurred among males and over 79% occurred between the ages 20 and 60.

Diagnosis and Treatment

LABORATORY procedures are fundamental in establishing the diagnosis of brucellosis because of its protean manifestations, its tendency to chronicity, and its similarity to many other diseases including another of similar occupational distribution—Q fever. Isolation of the causative organism through culture is the only positive proof in the diagnosis of infection.[9] While this

TABLE 5.
REPORTED CASES OF BRUCELLOSIS[1] BY AGE AND SEX
CALIFORNIA, 1949-1950

AGE GROUP	Total	Male	Female
Total	266	174	92
Under 1 year	—	—	—
1 — 4	3	2	1
5 — 9	13	7	6
10 — 19	22	16	6
20 — 29	58	39	19
30 — 39	78	54	24
40 — 49	47	28	19
50 — 59	28	17	11
60 — 69	9	5	4
70 — 79	5	3	2
80 — 89	—	—	—
90 and over	—	—	—
Age not stated	3	3	—

1. Reports of 231 cases obtained from morbidity records; reports of 35 cases obtained from Doctor's First Report of Work Injury.

Source: State of California, Department of Public Health, Morbidity Records; and Department of Industrial Relations, Doctor's First Report of Work Injury. Statistics compiled by Department of Public Health, Bureau of Adult Health.

may be difficult, according to Meyer,[2] "the diligent use of this procedure invariably yields cultures." Agglutination testing is the most valuable single procedure. Meyer states it is "dependable if its limitations are kept in mind and the test is executed with perfect reagents." No titer is diagnostic, but it is generally thought that titers of 1 to 80 or above are significant (especially a rising titer in series) when correlated with history and clinical findings. Complement fixation tests and opsonocytophagic tests may be used but are much more difficult and less practical. The intradermal test is of limited value in the individual case since, when positive, it merely connotes previous contact and sensitization. However, Heathman states the skin test may be of value in broad plant or other population surveys since there is evidence that the development of the allergic state, and hence a positive test, is due to long-continued exposure to small doses of organisms of a low degree of virulence. In general the incidence of the allergic state increases with length of service while, on the other hand, agglutinins tend to decline with time.[3]

Treatment of the individual case is more hopeful with the advent of the antibiotics. Reports continue to appear in the literature of excellent clinical responses obtained with various antibiotics, more recently the newer group, terramycin, chloramphenicol, and aureomycin.[10] However, the relapse rate is still too high and emphasizes the fact that a satisfactory curative agent has not yet been found.[11]

No effective immunizing agent for human infection is as yet available.

Prevention

A. FUNDAMENTAL to the control of brucellosis is the control of the animal reservoirs. Minnesota has pioneered in its area of testing and slaughtering of cattle.[12] It was demonstrated there that while brucellosis has increased in counties not under the control program, the control areas have shown no appreciable increase. However, this report is limited by the fact that counties with large urban populations and packinghouse plants were not included in this study. A further shortcoming of this type of control is that it is directed at cattle only. Hogs are now known to be another major reservoir of the infection and indeed may today constitute the relatively more important reservoir of infection so far as slaughterhouse infection is concerned.[13]

California's program for control of brucellosis in cattle is less costly. Here a state law requires the vaccination of all dairy heifers between six and 12 months of age.[14]

B. Preventive measures in the industrial plant include the following: (1) Protection of the skin where possible by means of wearing of rubber gloves or other protective coverings. It is appreciated that rubber gloves are impractical in many of the operations of the plant, but wherever they are practical they should be used. (2) Good housekeeping designed to keep to a minimum the accumulation of animal materials in the work place. This would lessen possibilities of both skin and respiratory contact. (3) Dust suppression measures and adequate ventilation. (4) Adequate and prompt treatment of cuts and other injuries received in the course of work. (5) Preemployment and periodic testing with agglutination and other laboratory tests. Air disinfection measures, by means of ultra-violet irradiation of aerosols, might be considered where feasible. Further research is necessary in this field.

C. A systematic program of research is needed to develop a satisfactory vaccination, more efficient diagnostic and treatment tools, and better animal control.

Q Fever

Epidemiology

THE FIRST observations of Q fever were made among abattoir workers in Queensland, Australia, and reported by Derrick in 1937.[14] Practically all of the natural epidemics of Q fever have occurred among persons having occupational activities involving livestock or their products. Not all of the factors in the mode of spread have as yet been clarified, but it is now apparent that infection in the great majority of cases is in some way connected with contact with livestock or their products. Numerous observations in this and other countries have established that the infection occurs naturally in sheep, goats and cattle, and the organism can be recovered from the milk, urine, feces, oral and nasal secretions, and placentas of naturally or experimentally infected livestock. While the highest attack rates occur among persons in direct contact with livestock, including farmers and packinghouse workers, many cases have occurred among people who live in agricultural communities or whose contacts have been only casual. Studies in Northern California have demonstrated the probability of infection by inhalation of con-

taminated dust or droplets on sheep ranches. The infection also apparently may be acquired by ingestion of unpasteurized milk.[15,16,17,18,19,20,21]

The occupational infection possibilities are as ramified as the animal products themselves. For example, recent reports describe outbreaks of Q fever in wool and hair processing plants and among railroad workers.[22,23,24]

Reference to Tables 6 and 7 showing Q fever cases in California for the years 1948 and 1949 indicate the wide occupational dispersion of the disease. Interestingly enough, among the large group of persons in miscellaneous occupations apparently unrelated to contact with livestock, the great majority resided in rural areas, suggesting the possibility of infection via inhalation.

Analysis of the incidence of Q fever by sex and age indicates the striking predominance of occurrence among males in the working age groups.

Topping's[15] report of the Amarillo, Texas, outbreak is particularly interesting. Here, there were 55 cases and two deaths among 136 employees, an attack rate of 40%. Both slaughterhouse and stock handlers were affected. Regarding the latter, the authors point out that the infectious agent was present in the stockyard for a considerable period. It may have been carried in the dust or the cattle themselves may have been infectious even though they did not appear ill or exhibit any remarkable gross pathologic change during processing.

Prevention

FURTHER research is needed to elucidate the exact mode of infection and spread of the disease. However, several effective tools are available for control. The complement fixation test is reliable for diagnosis of the presence of infection in both human beings and animals. In occupational groups this test is of particular importance in the differential diagnosis from brucellosis whose occupational incidence and clinical manifestations are often so strikingly similar.

Treatment of the disease with one of the new antibiotics, aureomycin or chloramphenicol, is usually effective. Immunization of exposed individuals with vaccine prepared from chick embryo yolk sac cultures affords good protection. However, booster injections are needed at least annually.[18,25]

As in the case of brucellosis, plant hygiene is important. This includes good housekeeping, dust suppression, adequate ventilation. Prompt medical care for upper respiratory infections, including serologic testing for Q fever, is fundamental.

Anthrax

"MALIGNANT pustule," an ancient disease, still occurs throughout the world. It is summarized in an excellent recent paper by Wolff and Heimann.[26] The disease takes a high toll among both animals and human beings in the economically depressed countries of the Middle East, Asia and Africa. In the United States for the 15-year period, 1934-49, there were 1,120 human cases reported. Reference to Table 8 indicates that almost all of them were of occupational origin, and more than half of them occurred in the New England and Middle Atlantic states. The largest number occurred in industrial processes in which animal material is handled, such as wool, hair, hides, and skins. The next largest incidence was in the agricultural

TABLE 6.
Q FEVER BY OCCUPATION
CALIFORNIA, 1948-1949

OCCUPATION	Total	1948[a]	1949
Total	412	166	246
Farmer	72	20	52
Sheep—goat	21	6	15
Cattle, including dairy	7	3	4
Mixed	6	2	4
Unspecified	38	9	29
Meat handlers[2]	25	15	10
Creamery workers	5	—	5
Cattle dealer	7	1	6
Veterinarian	4	3	1
Laboratory technician	2	2	—
Student	65	58	7
Agriculture and horticulture	20	18	2
Animal and poultry husbandry	29	28	1
Veterinary medicine	5	5	—
Other	11	7	4
Miscellaneous[3]			
Mechanic	14	5	9
Truck driver	13	4	9
Carpenter	6	4	2
Bartender	7	1	6
Blacksmith	3	2	1
Housewife	21	5	16
Other	156	38	118
Not stated	12	8	4

1. Reports of 394 cases obtained from Virus and Rickettsial Diseases Laboratory records: these are based on blood complement fixation tests done on specimens submitted by private physicians. Reports of 18 cases obtained from Doctor's First Report of Work Injury.
2. Includes butchers and slaughterhouse workers.
3. This group originates in rural areas predominantly.
[a]Laboratory work for Los Angeles area done mainly by U.S.P.H.S. and records were not available.

Source: State of California, Department of Public Health, Records of Virus and Rickettsial Diseases Laboratory; Department of Industrial Relations,[1] Doctor's First Report of Work Injury. Statistics compiled by Department of Public Health, Bureau of Adult Health.

TABLE 7.
Q FEVER[1] BY AGE AND SEX
CALIFORNIA, 1948-1949

AGE GROUP	Total	Male	Female
Total	412	373	39
0 — 9 years	1	1	—
10 — 19	13	11	2
20 — 29	96	86	10
30 — 39	107	100	7
40 — 49	87	77	10
50 — 59	54	48	6
60 — 69	34	31	3
70 — 79	6	6	—
80 and over	5	5	—
Age not stated	9	8	1

1. Reports of 394 cases obtained from Virus and Rickettsial Diseases Laboratory records. Reports of 18 cases obtained from Doctor's First Report of Work Injury.

Source: State of California, Department of Public Health, Records of Virus and Rickettsial Diseases Laboratory; and Department of Industrial Relations, Doctor's First Report of Work Injury. Statistics compiled by Department of Public Health, Bureau of Adult Health.

group in contact with livestock, and only a very small number occurred in the "other" classification.

Wolff and Heimann point out that, "The origins of industrial anthrax may be further classified into two broad groups, hide (and skin) and wool (and hair). In the hide and skin group, most, if not all, cases occur as a result of processes prior to the actual tanning and finishing operations. This may be due to the fact that the anthrax spore probably cannot survive the processes preliminary to tanning. In the hair and wool group practically all of the cases occur as a result of processes prior to the weaving and finishing operations. This is due primarily to the fact that the spore cannot survive the usual dyeing process. However, in nearly all establishments concerned with tanning and finishing of hides and weaving and finishing of wool, other preliminary processes, involving the handling of raw hides, skins, or hair and wool, are also performed. Consequently, included in the hide and skin industrial group are all operations concerned with the processing of hides and skins up to and including tanning and finishing of leather; and included in the hair and wool industrial group are all operations concerned with the processing of hair and wool up to and including the weaving and finishing of textiles (apparel) and carpets."

Industries which process hair, wool, hides and skins in the United States number 1,484 and employ over 250,000 workers. Eighty per cent of them are located in New England and Middle Atlantic states. While the total number of cases occurring in this country has gradually declined, the industrial cases have increased, mainly because of an increase in the hair and wool industries. In the last 10 years 82% of the industrial anthrax arose from contact with hair and wool, most of which was imported from areas such as India, North Africa and others.

Despite the apparent decline in anthrax incidence in the United States except in the Eastern states, physicians in livestock-raising areas must maintain a high index of suspicion. Physicians should be aware of the incidence of infection in animals in their regions. Table 9 records four cases in California in 1949-50.

Prevention

THE Massachusetts Division of Industrial Hygiene has adopted rules and regulations for the following industries in which anthrax is a hazard: leather manufacturing, wool processing, animal hair and bristle industry, carpet manufacturing, industries in which there are storage, handling and transport of animal products, such as hides, skins, wool, hair, bones, bristles. These regulations embrace dust control, good housekeeping, good sanitary and washing facilities, adequate protective covering, and individual clothes lockers for employees. In addition, a responsible plant official is required to arrange for immediate medical attention in all suspected cases; each employee must report any "sore, boil, or pimple" and all suspicious lesions must be seen by a designated physician who has "a thorough knowledge of the problems of anthrax."[27] Wolff and Heimann outline in detail specific control measures for the industries handling animal products.

Control on the farm includes vaccination of animals and provision for early diagnosis and treatment of human cases.

Early diagnosis and treatment with the newer antibiotics have removed the terror from this disease, but its severity still commands respect.[28,29]

TABLE 8.
REPORTED CASES OF HUMAN ANTHRAX, ACCORDING TO REPORTED SOURCE OF INFECTION, SELECTED NEW ENGLAND AND MIDDLE ATLANTIC STATES IN COMPARISON WITH THE TOTAL FOR UNITED STATES; 16 YEARS, 1934-1949, INCLUSIVE

State	Total Cases	Reported source of infection: Industrial	Agricultural	Other	Not Specified
Total, United States	1,120	735	192	31	162
New England and Middle Atlantic States	774	731	12	14	17
Pennsylvania	275	249	4	5	17
New York	208	202	2	4	0
New Jersey	120	118	0	2	0
Massachusetts	74	69	3	2	0
New Hampshire	59	58	1	0	0
Delaware	33	32	1	0	0
Connecticut	5	3	1	1	0
Other States*	346	4	180	17	145

*Approximately 65% of the cases in "other states" occurred in Arkansas, California, Louisiana, Mississippi, Missouri, Nebraska, South Dakota and Texas.

Source: WOLFF, A. H., and HEIMANN, H.: Industrial Anthrax in the United States. *Am. J. Hyg.*, 53:80-109 (Jan.) 1951.

TABLE 9.
REPORTED CASES OF ANTHRAX BY OCCUPATION AND ANIMAL SOURCE, CALIFORNIA, 1949-1950

OCCUPATION	SOURCE	NUMBER OF CASES 1949	1950	Total
Sheepherder	Sheep	2	—	2
Cattle farmer	Infected stock	1	1	2
Total		3	1	4

Source: State of California, Department of Public Health, Morbidity Records; and Department of Industrial Relations, Doctor's First Report of Work Injury. Statistics compiled by Department of Public Health, Bureau of Adult Health.

Leptospirosis

THE SYNONYMS, "swineherd's disease," "fish worker's disease," and others, indicate some of the occupational implications of leptospirosis. It is also frequently referred to as spirochetal jaundice or Weil's disease. Human infection is most often caused by the *Leptospira icterohemorrhagiae*. This organism most frequently infects rats, which, when they survive, remain infected for long periods of time, excreting the spirochete in the urine. Hence, human infection most often results from contact with water or other material contaminated by rat urine. Only fresh water can be infective, as salt and direct sunlight readily kill the organism. The organism

TABLE 10.
LEPTOSPIROSIS—METHODS OF INFECTION IN 195 CASES

Farm workers	23 (12%)	Handlers of food	8 (4%)
Sewer workers	22 (11%)	Navy personnel	2 (1%)
Fish workers	13 (7%)	Army personnel	47 (24%)
Coal miners	12 (6%)	Air Force personnel	8 (4%)
Bathing	9 (5%)	Miscellaneous	22 (11%)
Accidental immersion	3 (1%)	Unknown	13 (7%)
Working in water	13 (7%)	Total	195 (100%)

Source: BROOM, J. C., and ALSTON, J. M. Weil's Disease. *Lancet*, CCLV, No. 6516, page 96 (July 17) 1948.

TABLE 11.
REPORTED CASES OF LEPTOSPIROSIS BY OCCUPATION AND PROBABLE ANIMAL SOURCE
CALIFORNIA, 1949-1950

OCCUPATION	SOURCE	No. of Cases 1949	1950
Laboratory animal raiser	Evidence of rats in chicken water fountain	1	—
Pipe fitter	Worked at Encinal Pier	—	1
Total		1	1

Source: State of California, Department of Public Health, Morbidity Records; and Department of Industrial Relations, Doctor's First Report of Work Injury. Statistics compiled by Department of Public Health, Bureau of Adult Health.

is viable for at least 22 days in surface waters. It is estimated that 40% of sewer rats are infected with this disease. Several other strains of *Leptospira* have been isolated from human cases, the more important being *L. canicola*, the dog strain, and *L. pomona*, the pig strain.[30,43] It is suspected that dog-transmitted infection is more common than heretofore suspected.

Among the most common occupations affected are sewer workers, coal miners, fish workers and farm workers. In several countries it has been reported among workers with pigs and cattle. There are numerous reports of leptospirosis among the rice workers of northern Italy.[85,86] Table 10 gives some concept of the occupational spread of this interesting disease. In California for the years 1949 and 1950 two cases of occupational origin were reported, one being in a pipe fitter who had worked at one of the shipping wharves, and the other a man who raised animals for research (Table 11).

Since most cases of leptospirosis are occupational in origin, it occurs chiefly among adult males.

Infection occurs most frequently via the intact or injured skin, but may occur through the mucous membranes by means of inhalation or ingestion of contaminated water, by means of the bites of rats, dogs, or other infected animals, through other contacts with infected animals, via coitus with an infected person, and in the laboratory.

Diagnosis depends on a high index of suspicion whenever the history indicates possibility of contact with rat urine or other animal-contaminated material. Isolation of the organism is conclusive proof. Agglutination testing is helpful.[9] It should be noted that jaundice appears in only about one-half of the cases.

Prevention depends upon control of rats, principally, and other animals when infected, plus personal protective measures for the worker obliged to work in potentially infected materials. Vaccination may be effective in workers who are especially exposed. A study of vaccination showed in a vaccinated group of 1,262 miners a morbidity rate of 0.3%, while in a control non-vaccinated group the morbidity rate was 1.12%.[42]

Treatment of the disease with one of the new antibiotics is effective, if given early.[42,43]

Miscellaneous

THERE are a large number of assorted diseases which may be contracted as a result of occupational contact with animals or their products, but whose occupational incidence is relatively rare. *Tularemia* may be contracted by handling of infected wild rabbits and other animals, especially in laboratory work. A recent report calls attention to the possibility of tularemia infection from handling infected fowl.[83] *Bovine tuberculosis* may also infect human beings through contact with tuberculous cattle, but this disease in humans is rare in the United States today. *Glanders*, from contact with infected horses, is now a rare disease and practically extinct in this country.[44]

A recent report[45] describes the amazing saga of *tetanus* spores carried in goat's hair used as a binder in plaster which fell from the roof of an operating room in England, contaminated the talcum powder used for dusting gloves and resulted in tetanus in two surgical patients!

Virus diseases of animal origin also may be occupational. No consideration is given in this paper to those transmitted via insect vectors. However, there are several which apparently are transmitted through direct contact of air contamination with the animal or its products. *Psittacosis* must be suspected in bird handlers presenting signs of pneumonic involvement[83] (Table 12). *Rabies* may occur occupationally among veterinarians, mailmen, policemen, others.

TABLE 12.
REPORTED CASES OF PSITTACOSIS BY OCCUPATION
CALIFORNIA, 1949-1950

Occupation	Number of Cases 1949	1950	Total for 1949, 1950
Bird farm worker	—	1	1
Chicken farmer	2	—	2
Laboratory worker	1	—	1
Pigeon rancher	—	1	1
Squab raiser	—	1	1
Total	3	3	6

Source: State of California, Department of Public Health, Morbidity Records; and Department of Industrial Relations, Doctor's First Report of Work Injury. Statistics compiled by Department of Public Health, Bureau of Adult Health.

The *virus encephalitides* for the most part are probably transmitted from animal to man via insect vectors, although there are some reports of apparently direct contact transmission. *Louping-ill meningo encephalitis* is a signifi-

cant cause of mortality in sheep in certain parts of Scotland and North England. It occasionally occurs among sheep workers both on the farm and in the abattoir, and among laboratory workers.[46] *Western equine encephalomyelitis* virus is found in the brain of horses. This source is negligible in human infections although some have occurred in persons working with horses.[47]

Newcastle's disease of poultry has been rereported in laboratory workers[48] and others.[83] It may be manifested by a hemorrhagic conjunctivitis, malaise, chills, headache, neuralgia, paresthesia, slight fever and other mild symptoms. *Foot and mouth disease* may cause mild stomatitis and fever.[49] A new entity known as "cat-scratch fever" has recently been reported.[50]

Pigeon excreta, too, may transmit disease.[51] In Cincinnati, 12 men exposed to moistened pigeon excreta in an abandoned water tower all developed pulmonary illnesses characterized by fever, malaise, headache, chills, cough, weakness. Fever lasted for eight to 24 days. Physical examination revealed no signs, but the radiograph showed a "snow storm" of diffuse miliary infiltrates. X-ray changes persisted for two months or longer. All recovered. Autopsy on one man who died five months later of a myocardial infarct showed multiple microscopic lesions 1 to 2 mm. in diameter in the lungs and peribronchial lymph nodes. Many of the lesions had central caseous necrosis and "Langhans-type" giant cells unassociated with tubercle bacilli. Serologies and inoculation of blood of 11 of the 12 men into animals showed no evidence of infection with ornithosis, Q fever, coccidioidomycosis, blastomycosis, histoplasmosis, toxoplasmosis or other specific etiological agent.

Among the *mycotic* diseases, one may consider *coccidioidomycosis, blastomycosis, actinomycosis, sporotrichosis, trichophytosis,* and others. A fatal case of coccidioidomycosis has been reported in a wool sorter in Massachusetts.[52] The hardy organism was carried in sheep wool originating in the endemic Southwest.

Numerous other diseases may, under certain circumstances, owe their contact to occupation. These include rat-bite fever, Haverhill fever,[53] inflammation of the lower jaw in mother-of-pearl button makers,[54] respiratory and other infections among bone-button makers, coral and horn workers, feather workers, etc.[55] Fishermen may be the victims of bites of venomous fish, toxins from eels, cataracts from the larvae of trematoda connected with the excrement of seagulls found on the skin of fish.[56]

Two interesting sheep diseases may or may not have etiological relationship to similar diseases in man: *Swayback,* a disease particularly of new-born and young lambs, has been reported among human beings. Four of seven workers doing research on the disease in animals developed central nervous system disease resembling disseminated sclerosis. There is an interesting etiological problem involved here. The disease has not yet been transmitted experimentally, but it can be prevented by giving copper supplements to the ewes during pregnancy. In three of the four human cases reported there was a history of chemical work for 15 years. It is suspected that certain mineral trace elements may be important.[57]

Pulmonary adenomatosis or alveolar cell tumor of the lung in man is strikingly similar morphologically to *Jaagsiekte's disease* in sheep. In man it is a rare tumor of the lung characterized by the presence of tall columnar mucus-secreting cells lining the alveolar walls without evidence of bronchial origin or of primary adenocarcinoma elsewhere. In the past few years there has been an increase in the number of reported cases. However, there is no evidence that there is any etiological association between the two. The cause of pulmonary adenomatosis is still unknown. The ability of certain carcinogenic hydrocarbons to produce similar tumors in mice has raised the question of inhaled irritants as a possible factor.[58,59,60,61]

Skin Diseases

SKIN diseases account for the greatest volume of occupational diseases arising from animal contact. Two-thirds of this group of illnesses in California are dermatoses (Table 1). The occupational spread is broad, with fish handlers, poultry handlers and meat handlers taking the first three places in incidence (Table 13).

TABLE 13.
REPORTED CASES OF SKIN DISEASES DUE TO CONTACT WITH ANIMALS AND ANIMAL PRODUCTS, BY OCCUPATION—CALIFORNIA, 1949-1950

OCCUPATION	Number 1949	1950
Total	250	218
Fish handlers (fishing, canneries, restaurants, etc.)	109	85
Poultry handlers (farming, wholesale, retail, etc.)	66	54
Meat handlers	*46*	*50*
Butchers, retail	7	8
Packing house workers	24	27
Farmers (includes dairy farmers)	11	11
Restaurant and grocery store workers	4	4
Creamery workers	3	4
Tallow and rendering	1	3
Tannery, hide, leather and fur workers	21	13
Upholstery, mattress and wool fabric workers	1	1
Veterinarians and helpers	—	3
Laboratory workers	1	1
Animal kennel, rabbitry, zoo and circus workers	2	4

Source: State of California, Department of Industrial Relations, Doctor's First Report of Work Injury. Statistics compiled by Department of Public Health, Bureau of Adult Health.

The clinical types of skin affection are many, ranging from secondary infections of cuts and abrasions to allergies, bites, stings, and specific disease entities. Many skin manifestations occur as a part of systemic diseases already mentioned (mycotic infections, tularemia, tuberculosis, etc.), while many which are ordinarily regarded as primary skin conditions also cause systemic symptoms (erysipeloid, pemphigus, etc.).

Fish workers, whether fishermen, canners or restaurant workers, present the richest, most prolific incidence of occupational skin diseases caused by animal contact. Schwartz and Tabershaw give an excellent summary of the situation.[62]

Erysipeloid is probably the most common of the specific occupational skin diseases arising from animal contact. It is often referred to by both doctors and workmen as "fish poisoning," "turkey poisoning," or "meat poisoning" (Table 1). The etiological agent is *Erysipelothrix rhusiopathae*, the cause of erysipelas in swine. The organism is widely disseminated and can be found wherever nitrogenous substances decompose. It is viable for months and can change from the status of saprophyte to pathogen. It usually infects through the skin. In man it occurs in three clinical forms: (1) localized to skin, the usual form; (2) acute fatal septicemia, which is rare; (3) generalized cutaneous eruption with arthritic and other constitutional symptoms. In the common form there are pain, swelling and erythema at the site of the epidermal defect, usually the hands. The purplish-red erythema is diagnostic. It slowly progresses as a sharply defined, slightly elevated zone extending peripherally while the central portion fades. The area is swollen and tense. Migratory erythematous patches may appear at remote areas. The pain is usually throbbing and burning.

According to Klauder, the severity of infection often suggests its source. The order of clinical severity corresponds with the following order of sources of infection: partly decomposed fish, live slimy fish, swine, fish in the retail market, etc. Of 100 cases which he analyzed for occupation, he found 58 among abattoir workers, 16 in fish workers, seven working in tallow, grease or fertilizer, six retail butchers, and the remainder in assorted groups.[63,64,65]

Prevention depends upon avoidance of injury to the skin and prompt treatment of injuries. Detection and control of the disease in animals is fundamental. Treatment of the human disease is effective with penicillin.

Pemphigus or "butcher's pemphigus" is a severe and relatively rare disease occurring principally among meat handlers. It has also been reported among sheep shearers and persons who handle dead animals. It generally follows a septic wound of the hand. While the causative organism is not definitely known, it appears to be of bacterial origin. Clinically, pemphigus is characterized by bullae, which arise 24-48 hours after inoculation. In some cases there is generalized eruption of erythematous papules, vesicles and bullae. All layers of the skin are involved and there is high fever. The disease has a high fatality rate. Treatment is not satisfactory. Cortisone and ACTH have been tried with apparently only temporary remission.[66,67,68]

The virus of *contagious ecthyma* of sheep and goats is transmissible to man. The disease in man is characterized by a skin lesion at the site of inoculation, usually the hands and fingers. The lesion begins as a small erythematous macule which progresses to a sharply circumscribd umbilicated bulla measuring one to several centimeters in diameter and covering a cyanotic reddish-purple edematous bed. There may be moderate enlargement and soreness of the regional lymph nodes and a low-grade fever at the height of development of the bulla. There may be multiple lesions. Spontaneous recovery occurs in three to four weeks.

In sheep, the disease causes lesions about the mouth, accounting for its common name, "soremouth." Sheep-herders often contract the infection when bottle feeding lambs unable to nurse because of their sore mouths. The vaccine, an attenuated virus, for sheep protection, may also transmit the disease.

The disease in man is chiefly of importance because the virulent appearance of the lesion may be confused with cancer, anthrax, tularemia and other diseases. It is believed to be commoner than supposed, since most cases are not brought to the doctor. Two cases were reported to the California Division of Labor Statistics during the first three months of 1951. Both were among sheep-herders.[81,82]

Since the clinical types of skin disease are legion, no further detailed descriptions are included in this paper. Even a listing of the diseases and occupations would be formidable. A handful of references on the writer's desk gives an incomplete picture: butcher's dermatitis, mycotic infections in canneries, trichophytosis from silver foxes, skin diseases in workers in leather factories, milker's nodules, milker's warts, contact dermatitis due to beef fat, contact dermatitis due to chicken blood, coral dermatitis, sponge fisher's disease, etc.[69-78]

Laboratory Infections

LABORATORY workers are potential victims of practically all the diseases transmissible via animal contact. A recent comprehensive survey was done by Sulkin and Pike who tabulated 1,334 laboratory infections in the United States.[79] Brucellosis and tularemia were among the most common diseases. Reports of tularemia among laboratory workers have indicated a high incidence of infection "approaching 100%."[80] Prophylactic vaccination is recommended.

Comment and Conclusions

THE opportunities are many for the forces of industrial hygiene, public health, veterinary medicine, and agriculture to collaborate in the control of occupational diseases of animal origin. In the light of today's knowledge, there is no justification for defeatism in approaching these problems. Among the measures applicable to various aspects are the following:

1. Control of disease among animals.

2. Disinfection of animal products being handled (hides, wool, etc.).

3. Industrial hygiene measures in plants, including good housekeeping, ventilation, air disinfection, etc.

4. Personal protective coverings: gloves, goggles, respirators, etc.

5. Immunization where available and indicated: Q fever, tularemia, etc.

6. Medical care which is prompt and adequate to treat wounds early and diagnose and treat disease early.

Since the skin and respiratory tract are the chief portals of entry of these diseases, measures aimed at preventing air contamination and skin injury and contact are fundamental. Respecting the former, many of the usual industrial hygiene measures are applicable. Further research is needed in air disinfection measures such as ultra-violet light and aerosols.

Prevention of skin injury and contact is difficult but possible. Rubber gloves may be often impractical and even dangerous. The extremely rapid work pace many fish and meat workers are compelled to keep is a good example of "haste makes waste." It is often this factor which accounts for cuts and for deferment of medical attention until after the infection has taken place.

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Berea College Work Program

NOT ALL labor is conducted in mills, mines, shops, stores, farms, transportation, or households. Many a college long has fostered the dignity of labor as an essence in its educational program. Berea College, in Berea, Kentucky, on May 8, 1951, celebrated its own Annual Labor Day Program—its twenty-ninth. Of the cherished place of labor in its over-all activities, this College records: "'*Let it be a point of honour with you to keep calm and to go on looking after your affairs, working with your hands as we bade you; thus your life will win respect from the world around you, and you will not need to depend on others.*' Thus wrote Paul to the Thessalonians about 1900 years ago.

"Through the ages man has realized the great value of work to the individual and to society, and leaders have exhorted their fellow-men to greater things through work. Almost 100 years ago the founders of Berea College wrote into the constitution these words concerning the purpose of Berea College and ways and means by which it might be achieved: '.... to furnish the opportunity for a thorough education to all persons of good moral character at the least possible expense. To secure this end all possible facilities and inducements for manual labor shall be offered to its students.'

"It is doubtful if the framers of the College constitution ever dreamed that our present labor program would develop from that early provision for manual labor. There is no doubt, however, concerning the wisdom and foresight of those Founding Fathers who realized that learning to work was an essential of effective education and proceeded to make provision for a combined program of labor and learning.

"The first jobs at Berea College were primarily of a 'housekeeping' nature. The students cleared land for our campus, garden and farms, prepared and served food, washed dishes, kept buildings clean, did maintenance and construction work, and kept the pot-bellied stoves in dormitory rooms supplied with firewood.

"At the turn of the century the demand for jobs began to exceed the supply. The student industries, such as weaving and broom-making, were established in order to provide creative work opportunities for more students.

"The work experiences of students became such an important and integral part of the educational program that in 1906 the labor program was set up in order to provide jobs for *all* students, and official action was taken to require their participation.

"From 1918 to 1950 Dr. A. G. Weidler, now Dean of Labor Emeritus, directed and promoted the labor program in such an effective manner that it achieved world-wide recognition and acclaim. New student industries and new labor departments were developed through the years in order to provide job opportunities for more students, enabling them to create goods and services of great value."

For the conservation of the health of its students, faculty and community, Berea College maintains a Student Health Service, well guided by its Director, DR. J. W. ARMSTRONG. As the need arises, which is often, in a just sense this medical department well might be designated the Student Industrial Health Service.

The Task of Medicine in an Industrial Society

— The 1951 Ramazzini Oration —

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IT BECOMES a matter of sheer necessity, from time to time, for the thoughtful person to take counsel with himself, to examine carefully the pattern of his opinions and efforts in the light of events, and to plan a future course. Whether such soul-searching springs from the conviction of sin, the recognition of danger, or the less dramatic and more objective appreciation of the responsibilities of the role in which circumstances or choice have cast him, the urgency of the situation may seem great to the individual. It seems all the greater, if, as in this case, the individual undertakes to voice the judgment of a responsible group of his associates. It was in such spirit that the challenge and the opportunity of occupational medicine were pointed out at one of these annual gatherings, when one of our number,[1] acutely conscious of the sickness of our society, prescribed for it a therapy born of occupational medicine. There was a boldness, almost a brashness, in this prescription, founded as it was on little but faith and hope. There was, however, a fitting humility, with respect to the precise character of the therapy and the means by which it might best be applied. It might seem that such humility is lacking in the present approach to this same malady, so evident and so aptly described. Certainly he who argues for a major change in the character of medical practice, and prescribes the specific means by which medicine is to approach the task which lies before it, seems somewhat lacking in discretion. My purpose, none the less, is to do just that. Where Johnstone has not presumed "to dictate the manner or method of how this (our task) is to be accomplished," I shall undertake to translate his basic idea into general principles and methods. Lest I be accused of foolhardiness, however, let me point out two factors that may temper such criticism. The one is that we, who have long been concerned with the practice of medicine, as it relates to occupation and industry, and are engaged in the training of those who will follow us, must formulate a program, which, if not wholly sound, must be the best that our wisdom and experience can provide. The other is based on the admittedly faulty but highly pragmatic faith that what is said within this group will be accepted within and beyond it only to the extent that it is worthy of acceptance; that it will be tested and altered and supplemented as it may deserve.

From the Kettering Laboratory in the Department of Preventive Medicine and Industrial Health, College of Medicine, University of Cincinnati.

Presented at the 1951 Rendezvous of the RAMAZZINI SOCIETY, Absecon, New Jersey, June 8.

Through the centuries, the practice of medicine has undergone both superficial and fundamental changes, sometimes gradual and sometimes abrupt, in accordance with the ideas and conditions of the times and the patterns of community life. From the medicine man, with his invocation of spells and his casting out of devils, to the modern physician with science at his beck, the position, the technique and the training of the medical man have been subjected to radical change. As Henry E. Sigerist[2] has said, "the goal (of medicine) is social. Medicine, by promoting health and preventing illness, endeavors to keep individuals adjusted to their environment as useful and contented members of society." It must be apparent to all who accept this dictum, that the human environment has always been a matter of prime concern to the physician, and that significant changes in the environment presuppose change in the methods, or at least in the application of the methods, of medicine.

What then can we think of the likelihood of stability in the present form and scope of medical practice and medical education? Human society, historically, has had a dynamic, not a static pattern, and, in these latter times, the pattern has changed so fundamentally and at such an unexampled pace, that we are in danger of losing social and cultural continuity from one decade to the next, while the discontinuity between generations is all too apparent. Suddenly, almost, the American people have left behind them the comparatively simple life and personal relationships of an unstratified agricultural, pastoral and hand-craft society, and have plunged into the welter of a previously unexplored and highly complicated social and economic structure based on the applications of the physical sciences. The industrial revolution has accelerated its pace in recent years under the influence of two merging periods of intense world-wide social, economic and military strife, so that the physical world in which we live, expanded in terms of the variety of individual experience which it offers, but compressed in space and time by modern technology, is scarcely recognizable, in its impact on human life and well-being, as the natural world in which, and with which, the animal, man, began to strive for subsistence and survival. The major threats to human life and health and sanity, the products of which now occupy the time and attention of the physician, are not those of half a century or even a quarter of a century ago. They do not arise out of a familiar or natural environment, but out of an ever-evolving set of new environmental conditions which we have created and are creating anew,

without taking the time, even if the means were available, to appraise them with physiologic knowledge and social wisdom. Ours is, in short, an industrial society, with all we are learning to imply by that term. This society has come into existence under our very eyes, and, despite its emergence as the most striking phenomenon of modern times, we are but little aware of it, because it has engulfed all of us so quickly that our adaptation to it has been largely instinctive rather than rational. But how can such a society fail long to demand and to obtain medical service adapted to its social and economic pattern? If it does not find such service in the armamentarium of the physician, it will find it, notwithstanding, elsewhere. The steps taken in that direction are all too apparent. Therefore, it behooves the physician, in the performance of his social duty, to explore and to learn the physiologic significance of the industrial environment, not so much because his efforts will be supplanted, partially, if he does not, but because this gigantic task cannot be met effectively and speedily without him, his skills and his traditional attitude of mind. Moreover, and this may be much more to the point, the physician, being deeply involved, himself, in the stresses, conflicts and frustrations that plague his fellowmen, is being put to the ancient test of first healing himself before he can be trusted far with the maladies of others.

In the consideration of this general task of modern medicine, it seems logical first to examine the contribution that must be made by industrial medicine toward a general change in medical objectives. The industrial physician, above all others, should recognize and cope with the medical problems of an industrial population. That he does not do so, generally, is not the point. He must find means of achieving this strategic position.

The Nature and Scope of Industrial Medicine

IT IS NEITHER possible nor necessary to visualize completely the eventual role of the physician in industry. In the light of experience, however, certain aspects of the situation confronting him can be stated so as to show what he can employ of the skills and knowledge which he now possesses, and something of that additional skill and knowledge which he must acquire.

Professional Poise

THE qualities that have characterized the physician, as differentiated from the medical tradesman, technician or even scientist, have been a deep concern for his fellowman, in conjunction with an abiding interest in the things of the spirit that contribute to the good life for the individual and for society. His undertaking to learn and to apply the arts of healing, as a life's work, have given him, in varying degree from time to time, the role of father-confessor, counsellor, savior and servant, to those who seek his help. That no mere man can measure up to this task has not deterred him from dedicating his wisdom, skill and strength to these ends. He has maintained himself in independence, subject to the bidding of no other man in the performance of his duty as he himself has defined it under the tutelage and support of his professional associates. This professional viewpoint is the foremost among the qualities which the physician must take with him into industry. The industrial physician has often been subject to the suspicion and skepticism of his colleagues and, sometimes, of his patients, on this score, and with some justification. To much too great an extent the physician accepted the commercial character of the call made upon him to enter industry, and was willing to be told what was required of him in the way of service and loyalty by industrial management or by the representatives of industrial employees. Certainly it is not too unusual to find industrial executives or labor leaders who have a better understanding of the more obvious medical needs of industry, both generally and in specific instances, than do many physicians, but if and when this is true, it yet does not absolve the physician from professional and social responsibility. The truth of the matter is that neither industrial management nor industrial employees know, or can be expected to know, what they should have in way of medical aid and advice in relation to their work. If the physician, as well, finds himself wanting in this situation, he must approach the problem with free and objective mind and with the intellectual poise and humility which will preserve him alike from ignorance, authoritarianism, economic bias, and social prejudice. Only a true devotion to the ancient principles of his calling, which spurns the blind alliances and loyalties of social and economic cliques, can provide this, the mandatory qualification of the industrial physician. Without such spiritual and intellectual armor, medicine in industry is spurious, and the medical man, making no significant social contribution to the business organization, falls to the level of the partisan or the hireling.

Clinical Knowledge and Skill

THERE seems to be an opinion, even among industrial physicians, that the doctor in industry need not be a good clinician. Without reference to our present qualifications, and on the basis of what must be achieved, I take strong issue with the idea that the industrial physician should be an administrator, primarily, or a social scientist, primarily, or a toxicologist, primarily, or anything else, primarily, rather than a well trained, competent doctor. Truly he must often be something of an administrator, whatever that may be in terms of the qualities that promote judgment and leadership, and he must have other capacities, to some of which reference will

be made later, but he should, above all else, be a wise and skillful practitioner in a field which qualifies him and gives him place among his colleagues and patients. In any medical organization in which he works, he should, if he is the head, be, in fact, the chief of staff, and if an associate or a consultant member of the staff, he should take his place in a normal professional relationship as one known and respected for his medical competence. This brings us to examine the nature of the several contributions that can be made by clinical medicine to the day's work of industrial medical practice.

It may not be apparent, generally, that the appraisal of the hygienic status of those who, collectively, make up our industrial population, is one of the most pressing hygienic problems with which the people of this and other industrial nations are presented. Certainly the productivity, health and general well-being of those who work in the industrial community are the vital concern of all. The people of a nation are its one asset of first magnitude, and those who work are the source of the wealth and sustenance of the population as a whole. It is this which makes the development of effective industrial medicine so important, and raises the problem of the overwhelmingly large proportion of persons employed in small groups without medical or hygienic guidance to the level of major significance in the field of the public health. What is the state of the public health in this new and formidable industrial environment? What is the productive capacity of the industrial population, and what could it be under better or optimum conditions with respect to matters of health and safety that are amenable to control? Who knows and how shall we find the answers to these and other significant questions? Regardless of the methods that must be developed and applied to render such information available on a plant-wide, industry-wide or country-wide basis, the primary data can be obtained only by the application of sound clinical methods of examination and diagnosis to individuals. Here the clinician is at home, and if he requires justification for the expenditure of much of his time in the careful examination of industrial personnel in all categories of employment, he need seek no further. Strange as it may seem, this type of clinical work in industry does require justification, even, or perhaps especially, among physicians. There is reason for some reservation of mind as to the practical usefulness of periodic health examinations in the private practice of medicine, but it is not generally realized that the position in industry, in this matter, is different. The relationship of the physician in private practice to most of his patients is discontinuous for certain very practical reasons, including economic considerations; this relationship in industry has, or can have, effectual continuity. In private practice the periodic examination of the apparently well person often seems irrelevant to both patient and physician; in industry it has a functional significance, in relation to safety, productivity and satisfaction in the work of the day and of a lifetime, which is apparent bilaterally. These and other factors create the advantage to all concerned of having valid information on the occurrence and progression of diseases of all types, occupational and non-occupational, in the working population; of placing men and women in jobs for which they are best suited; of carrying out a good health maintenance program founded on the early recognition of disease, stress and susceptibility thereto; and of promoting health through the control of communicable disease and the cultivation of good health in individuals and groups. The contribution that must be made in these directions by clinical medicine in industry has not been appreciated sufficiently in its broad implications. Clinical facts are needed for visualizing the hygienic problems, for measuring health hazards and assessing progress in their control, and for guiding policies in matters of health and safety. Such facts will not be available until valid raw data have been obtained by the careful, skillful, clinical study of individual workmen repeatedly and in sufficient numbers, in relation to general and specific environmental factors, to elucidate the patterns of stress, injury, illness, disability, incapacitation and aging in the clear terms of rates of attack or incidence, etiology, rates of development, prevention, cure and rehabilitation. Our vital statistics in these matters, from which, admittedly, much of value has been learned, in addition to being hopelessly incomplete, are not those of a living, producing population. What do they reveal of impairments in productivity? What we have of valid statistics are largely *mortal*, not those that are *vital* to our progress. They are those of the dead and of past events, not those which assess the capacities and forces of our time, and certainly not those which illuminate the trends toward the future. There is evidence, however, that such information can be obtained, and efforts of limited scope are being made in one or more of these directions in individual industries, or in groups of industries. They are but isolated examples of what might be done, and straws that indicate the direction of minor currents of medical thought and action. They must grow in scope and prevalence, before they can achieve general significance or reveal their general applicability and worth. But we must not fail to recognize that the success of all such efforts will depend upon the accuracy of clinical observation and the soundness of the clinical judgment in the individual case. The clinician, it would seem, must give us the basic information on which large and urgently needed steps in preventive medicine can be founded. That he cannot do this alone, or through the use of current methods of clinical medicine alone, does not detract from the sig-

nificance of his role, and should not suggest that there is not a crucial need for the most and the best service that he can render.

Preventive Medicine

THE methods of medical study applied to groups of persons and to environmental conditions, and the procedures which have been employed in the appraisal of environmental factors which contribute to human health and disease, are known to some degree by the modern student of medicine, but are not generally represented in the armamentarium of the practicing physician. So concerned has the latter been with illness and injury and with the proper care of the sick and injured, that he has generally ignored, when he has not resented, the practice of preventive medicine. It is not surprising, therefore, that the efforts of the practicing physician have been confined largely to the curative aspects of industrial medicine, or as it has been called so often and so significantly, industrial surgery. Such a limitation of vision and interest is, however, a most unfortunate situation in an industrial society, as it has been in earlier periods and still is in a society that has continued to congregate in communities of ever-growing size and complexity. Not infrequently, under appropriate conditions and circumstances, ranging from the ubiquity of disease vectors in a backward or primitive area, to the multiplication of air-borne, water-borne or food-borne diseases in a heavily populated community, curative medicine has found itself bogged down in futility in the midst of overwhelming numbers of the sick and dying. Curative medicine stands on the very threshold of failure, when the stark and insidious physical and mental hazards of a technologically clever but socially reckless people grow in endless variety and to ever larger proportions in factories, offices, highways and homes, and when the conditions and conventions of professional practice are such that the majority of the citizens of the nation lack the medical and hygienic guidance that could promote their bodily security and their social responsibility. What is required urgently, as a first and salutary step in this direction, is the application of the methods and disciplines of preventive medicine and public health, with some necessary but not fundamental modification, in the field of industrial health. Physicians, in large numbers, must acquire the viewpoint and the familiarity with the methods which will enable them to take their part in the mastery of the hazards of the industrial environment and those which spread from this environment into the entire community. They must learn their part in this task, and they must be capable, as have physicians in the field of public health, of fitting easily and naturally into the company of those with whom they must work. Preventive medicine in industry, in addition to clinical medicine, is made up of precise and first-hand knowledge of industrial environmental factors and of the physiological limitations within which human experience in relation to such factors, individually and collectively, is compatible with the health and well-being of individuals and groups of individuals. The control of the industrial environment is another matter, as is the methodology and instrumentation of the measurement of the intensity of specific environmental stimuli. Rarely will the control of physical and chemical factors in the environment come within the capabilities or functions of the physician. The chemist, the physicist, the meteorologist, and the engineer, and often others as well, will be called upon for their special contribution, and only through the united efforts of all can certain problems be solved. The organized relationship which should exist between the members of the hygienic ensemble themselves, and between this group and industrial management, has been subject to some discussion and not a little disagreement, chiefly because of artificial or trivial considerations. Suffice it here to say, without regard to organizational theory, perhaps, indeed in spite of this modern fetish, that the real consideration involved is human health, and not some by-product of health that in short-sighted lay or managerial viewpoint may become dominant. Human health, in law and practice, is so obviously a matter for medicine that it is only through the default of the physician that it has found its way into other hands. It should not, and cannot, by the true physician, be allowed so to remain, in the industrial organization.

Clinical Research

AS THE INDUSTRIAL physician is compelled to resort to the methods of those skilled in the study of the hygienic status of the group, so he is challenged with the necessity of applying the methods of clinical study that have been developed in centers of medical learning and research. The clinical problems which exist in industry, and which, in part, have risen out of the industrial organization and economy, encompass the whole of clinical medicine, with its unsolved, as well as its solved, problems. For many reasons, the problem of the contributory effects of occupational conditions upon diseases of non-occupational origin becomes increasingly significant, medically and economically. Only the best of medical facilities can be applied with any hope of success to this series of problems. Here is an unparalleled opportunity, almost wholly non-existent in any other site, and certainly not otherwise implemented by immediate and ultimate economic necessity, for studying the onset and development of a wide variety of diseases, for identifying the factors which initiate such diseases and influence their progress, for determining the extent to which work itself, and its mechanical, toxic and psychic stresses, accomplish their wear and tear and cut down human productivity and the span of human life. Only a minute segment of our population is being

studied in relation to these factors and then only in the most superficial and intermittent manner. Here is a means of bringing into industry the methods and instruments of precision of clinical medicine and of applying them to the study of our industrial population, with such prospect of medical, social and economic profit to the community as can hardly be imagined. If medicine is to fulfill its promise to modern society, it must find where and how to apply its skill on a broader base. The industrial plant, with its population, is certainly a strategic point of application.

What of the economic basis for the expansion of clinical investigation into industry to which reference has been made? Can industry afford to embark upon the support of so ambitious a medical program? Current trends, as expressed in compensation for occupational disability, and in reimbursement of industrial employees for wage and salary losses occasioned by non-occupational illness and injury, are such as to point clearly to the likelihood that the cost of much of the illness and medical care of our entire working population will be borne largely by industry in the near future. The evidence also indicates that these costs will be huge and of an expanding and unpredictable type. Sound business policy would seem to require that greater control of disease and of its associated cost be achieved by applying the best that preventive medicine can offer, and that some means be found for defining the nature, scope and magnitude of the medical and economic problem. It seems highly doubtful that responsible industrial management can afford not to take significant strides along these lines at the earliest possible time. It seems evident also that humanitarianism, as well as ordinary prudence, on the part of physicians and medical educators, should reveal to them the duty of providing an invaluable service to the community, and the opportunity, as well, of advancing their own professional knowledge.

Education in Industrial Medicine

MEDICAL education in relation to the practice of industrial medicine has had scanty consideration and practically no serious attention at the hands of medical educators until very recent years. A certain amount of interest in the inclusion of instruction in industrial medicine in the undergraduate medical curriculum, and some rather poorly rewarded enthusiasm for the dissemination of information among medical practitioners on industrial medical problems, has been shown by individual teachers or departments in medical schools. It is obvious that training in the highly differentiated form of medical practice which has been the subject of the foregoing discussion does not fit into the objectives of undergraduate medical instruction. The problems of industrial health are much too advanced for the consideration, in more than a superficial manner, of the medical student, until he shall have been grounded in the study of disease and well along in his apprenticeship in clinical medicine. Even in his later years of study, instruction can hardly go far beyond a natural infiltration of other courses of study by means of examples and cases of industrial significance. It should be equally evident that something much more extensive, and at the same time much more intensive, than the common fare of the medical convention or the post-graduate refresher course, must be set before the practicing physician, if he is to appreciate the significance of industrial medicine and add something to his competence in participating in such practice. The time for attracting his attention and stimulating his interest by means of propaganda has lapsed, in large part, in favor of real provision for effective instruction in the essential viewpoint and subject matter of industrial medicine. Hence, the inauguration of courses of graduate professional training in industrial medicine in several of the American centers of medical education is gratifying as an expression of an increasing awareness of the problem and an impending intelligent grasp of the requirements for meeting it. Such courses are designed mainly for resident graduate study over considerable periods of time. It is entirely feasible, however, to plan and carry out short-term courses of specialized character for practicing physicians.

The subject matter represented broadly in the courses of graduate medical training now being offered in institutes of industrial health (or medicine) in several American universities has been carefully catalogued by Kammer[3] recently, and need not be dealt with here. In line with the foregoing discussion, however, a few comments may not be amiss. These courses have two primary purposes. The one is to reorient the physician, to direct his attention to the special medical problems and the hygienic needs of industry, and to train him to deal with these special problems and the needs of people in industry, individually and collectively, as a clinician and as a specialist trained in the application of the principles and techniques of preventive medicine, as they relate to industry. The other is to awaken and nurture in the industrial physician a vital professional awareness of the nature of the society of which he is a part, of how it has evolved and differentiated historically, of the part that industry plays in it, and of the comparative structure and function of industry. The extent to which either or both of these purposes can be accomplished is determined by the limitations of time, by the interest and capacity of the student, by the quality and availability of the resources of the university in the fields of medicine, engineering, law, and the social sciences, and finally by the quality and quantity of resident medical training in industrial organizations that lend themselves to this service.

A third purpose must be served by this graduate program of training. An appreciation of

the dynamic character of industry and of industrial medicine must become a part of the very life of the industrial physician, if he is to grow in stature and in the appreciation of his professional and social responsibilities. He must acquire, if he does not possess, habits of mind and of study that will keep him abreast of his field, and an informed consciousness of the role of investigation in modern medicine, and particularly in industrial medicine. On this account, he must work and study for a considerable period of time in the midst of the fundamental and applied research that concerns itself with current problems of industrial health. The life's blood of industrial medicine is investigation. Adequate professional training in this field begins by cultivating the spirit of inquiry, develops by inculcating the methods of systematic investigation, and culminates, at best, in a mature capacity for independent critical judgment within the limits defined by individual choice and experience.

Adaptations of General Medical Practice and Education

THE interdependence which exists among the specialized fields of medical practice is too evident for comment. No amount of attention to the importance of the industrial features of the present-day world, or to the role to be played therein by industrial medicine, should blind one to this interdependence, or permit one to believe that the practice of medicine, generally, in an industrial society, might be absorbed soon or later, to a large extent, into the expanding structure of industrial medicine. Rather, the burden of our thesis has been that the special medical problems of industry are numerous and varied, and that industrial medicine must assimilate and apply the methods and facilities of the broad fields of medical practice, investigation and instruction toward objectives that coincide with the urgent medical needs of the working population. That this will leave intact a large field of medical activities is apparent to all who give thought to the matter. Industrial medicine, we must insist, is predominantly preventive medicine in industry, with special emphasis on the occurrence and physiological significance of occupational stress and disease, and on the qualitative and quantitative appraisal of the industrial environment in these respects. To oversimplify the situation, the primary concerns of industrial medicine are diagnosis and prevention, and not therapy. Thus the entire field of surgery, normally and in principle, lies outside industrial medicine, and the systematic treatment of disabling disease is generally delegated by the industrial physician to his colleagues in other fields of medical practice. Other types of specialized practice that impinge rarely, if ever, upon industrial medical practice, require no mention. Moreover, satisfactory or even nominal medical service in industry cannot, for a long time to come, be achieved by the efforts of those who choose to practice industrial medicine exclusively. The large proportion of those who work will continue, as now, without benefit of preventive medicine designed to fit the industrial scene, unless it is supplied by private practitioners, who, having interest and opportunity, accept their professional responsibilities and equip themselves for effective service in industry.

Provision for adequate medical service in industry and appropriate training of physicians to that end, therefore, will not reduce the quantity or quality of medical service, generally, but rather will improve it and enlarge its scope by disclosing and emphasizing individual and social needs which now are largely unrecognized or neglected. The greater awareness of the task engendered thereby will challenge the resources of modern medicine. The resultant changes in medical practice and medical education are likely to be gradual, as wisdom would seem to dictate, but, evolutionary or revolutionary as they may be, they must come. Indeed, the time is late. Modern man is committed to the industrial pattern of community life. The circumstances and conditions of such a way of life make increasingly insistent and new demands upon those who accept the responsibility for health of the people. The duty laid on medicine is that it direct its efforts and suit its skills to the needs of society, that it train its disciples to recognize and to cope with the environmental threats to individual and collective health of body and mind. It is but a step from preventive medicine in industry to preventive medicine in society. The methods applicable to the part will be suitable for the whole. Through this means industrial medicine, by achieving professional maturity, may influence the whole of medicine.

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Occupational Cancer and Other Health Hazards in a Chromate Plant: A Medical Appraisal

— I. Lung Cancers in Chromate Workers —

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RECENT observations made among American manufacturers of chromates[1a-d] have confirmed evidence previously reported from German chromate plants which showed a high incidence of respiratory cancer among members of this occupational group.[2a,b] Although there are only seven principal producers in this country, the products are incorporated in manufacturing processes of other industries and are used in various trades. The number of individuals exposed to chromium compounds is therefore considerable, and the problem thus extends beyond the limited scope of the chromate plants. With these implications the present study required a comprehensive appraisal to ascertain the sources and nature of occupational cancer and other health hazards in a chromate plant. For this purpose an investigation consisting of epidemiological, medical, engineering, and chemical phases, was initiated. Some of these phases were reported and appear elsewhere.[1b,3a,g]

1. Environmental Aspects

IN A PREVIOUS report of the plant studied it has been shown that the environment of each occupation was contaminated with both trivalent and hexavalent chromium.[3d] Plant production jobs were classified into three groups according to the ratio of Cr^3:Cr^6 in the environment. It was found that in the majority of occupations the employees were predominantly exposed to Cr^3 ion. The weighted average concentration of chromium in milligrams per cubic meter of air ranged from 0.06 for office workers to more than 1 mg. per cubic meter for certain production and maintenance employees, and, in general, maintenance personnel received the most severe exposure.

There are three distinct types of chromium compounds to which the workers of the chromate-producing plant under study are exposed. These are the insoluble crude ore chromite, which contains the trivalent (Cr^{+3}); the soluble sodium monochromate containing the hexavalent chromium (Cr^{+6}), the intermediate formed after the roasting treatment; and the soluble sodium dichromate which also contains the hexavalent (Cr^{+6}) which is the finished product. Other major chemical compounds handled in the plant's manufacturing processes are the raw materials lime, soda ash, sulfuric acid, and the by-products aluminum hydrate and sodium sulfate.

2. Epidemiology of Respiratory Cancer

A COMPREHENSIVE study of the employment records of the chromate plant was conducted of all previous and present chromate workers as well as their work history prior to employment at the plant. Microfilm records and master files were established for analysis and future control. The epidemiological study included county and industry comparisons and finally the tracing of all employees who had worked for one year or more at the chromate plant, to determine whether the individuals were alive or deceased, and, if deceased, their cause of death. This study was previously reported[1b] and showed an abnormally high incidence of respiratory cancer among chromate workers as compared to the male population of Lake County where the plant is.

The following Table I illustrates the statistical significance of the epidemiological study:

TABLE I.
RATIOS (IN PERCENT) OF DEATHS FROM CANCER TO TOTAL DEATHS IN A CHROMATE PRODUCING PLANT AND IN LAKE COUNTY

	All Causes		All Cancers		Cancer of Respiratory System		
Location	No. of Deaths	Percent of All Deaths	No. of Deaths	Percent of All Deaths	No. of Deaths	Percent of All Deaths	Percent of All Cancers
Chromate Plant[1]	33	100.0	9	27.2	6	18.2	66.7
Lake County[2]	2931	100.0	298	10.2	34	1.2	11.4
Difference in Ratios	—	0.0	—	17.0	—	17.0	55.3

1. 1931-1949.
2. Control Group, 1937-1947.

The observed differences in Table I between Lake County and the chromate plant of 17.0% in the ratio of all cancer deaths to total deaths, 17.0% in the ratio of deaths due to cancer of the respiratory system to total deaths, and 55.3% in the ratio of deaths due to cancer of the respiratory system to all cancer deaths confirm in a general way the findings of previous investigators.[1a-d] The differences in the chromate plant between the observed number of deaths due to all cancers and to cancer of the respiratory system and the expected number, if cancer deaths were distributed in the same proportion in the chromate plant and Lake County, are very large. The probability that these differences are due to

TABLE II.
TABULATION OF DEATHS CAUSED BY LUNG CANCER IN CHROMATE WORKERS

Name	1st Expos Date	Death Date	Yrs of Exp	Latent Period	Wtd. Ave. Exposure† Mg. Cr/M³ Insol	Sol	Total	Exposure Years Insol	Sol	Total	Ratio§ Group No.
C.B.	5-33	8-43	9.0	10.0	0.19	0.09	0.28	1.71	0.81	2.52	2
T.G.	1-32	3-50	14.5	14.3*	0.19	0.04	0.23	2.85	0.6	3.45	2
F.J.	6-32	12-44	12.5	12.5	0.10	0.01	0.11	1.25	0.13	1.38	3
J.K.	5-36	6-45	7.5	9.0	0.48	0.15	0.63	3.65	1.25	4.90	2
E.L.	1-34	1-48	9.25	14.0	0.58	0.08	0.66	5.36	0.74	6.10	3
E.S.M.	10-41	12-48	2.0	7.2	0.10	0.01	0.11	0.20	0.02	0.22	3
W.D.S.	8-31	12-38	7.25	7.25	0.58	0.08	0.66	4.21	0.58	4.79	3

*Pneumonectomy, 1946.
†See Brandt, A. D.: Industrial Health Engineering. New York, John Wiley & Sons, Inc. 1947, p. 44.
§From each person's weighted exposure to the soluble and insoluble forms of chromium, the ratio of $Cr^{6}+$ to $Cr^{3}+$ was computed. Group 1 consists of those workers having a ratio of 0 to 1.0, a predominantly soluble exposure. Group 2 has a ratio of 1.1 to 4.9, representing an exposure to considerable amounts of insoluble chromium, and Group 3 has a ratio of 5.0 and above reflecting an exposure in which insoluble trivalent chromium is predominant.

chance is extremely remote. They appear to be statistically significant if the chi-square is applied to the data recorded in Table I, although the small number of chromate cancers included in such a calculation makes this procedure questionable.

The chromate plant which at the time of the present survey was in existence for only 17 years with an average plant population of 210, representing 1% of the labor force in the county, accounted for 10.8% of the total respiratory cancer deaths recorded by residence and occurrence in Lake County over a 12-year period. One respiratory cancer death of a chromate worker occurred outside of the county and was not included in this calculation. Similar observations have continued to 1951, and show that a percentage of 10 is still maintained. These figures, although small, reveal the effect of the latent period on the respiratory cancer rate of a particular plant as well as of the county. The geometric mean latent period of respiratory cancers in chromate workers was 10.6 years.

3. Etiology of Chromate Cancer

THE question of which of the chromium compounds might be involved in the causation of the respiratory cancers is of prime importance, not only for circumscribing the extent of the occupational and environmental chromium cancer hazard, but also for determining the means of prevention and control. The opinions as to the type of chromium compounds involved vary a great deal with different investigators. Gross[4] as well as Machle and Gregorius[1a] concluded that the carcinogenic action was related to the monochromates, because lung cancers were not observed in operations in which bichromates are used or produced, respectively. Bauer,[5] on the other hand, believed that free chromic acid and bichromates were the responsible agents. Chrome ore (chromite) has generally been absolved of playing a causal role because chromite miners allegedly were free from lung cancers and because chrome ore was thought to be harmless on account of its insolubility in the body (Koelsch).[6] A similar type of reasoning was advanced in placing the responsibility on zinc chromate as the cause of lung cancer among chrome pigment workers because it is more soluble than barium or lead chromate (Gross and Koelsch).[7]

In view of the controversial aspect of the causal chromium compound a detailed analysis of the type, degree, and duration of exposure to the various chromium containing chemicals, by the different worker groups, and especially by the individuals afflicted with lung cancer, was made.

In Table II, the calculations of weighted average exposure were adjusted for each change of occupation that the deceased worker performed during his years at the chromate plant.[3d] The worker's exposure ratio group was calculated from this over-all weighted average exposure. On this basis, none of the deceased lung cancer cases fell into the exposure ratio of Group I, thereby indicating a predominant exposure to insoluble chromium for the lung cancer cases. However, since only 4% of the present plant population works in occupations in which the exposure is predominately to soluble chromium, it may be possible that an insufficient total number has been exposed to the soluble chromium over a period of years to show whether this form of chromium may also cause cancer. The number of deceased lung cancer cases was too small to provide a statistical correlation with exposure years.

The fact that approximately 96% of the plant population in its various occupations was exposed to predominately the insoluble chromium compound, chromite, at this particular plant, together with the statistical confirmation of the abnormally high incidence of respiratory cancer which was derived from that plant population, suggests that the inhalation of dust of chromite ore might not be without importance in the causation of lung cancers.

In view of this observation, it may be well to review briefly the evidence and arguments advanced concerning the carcinogenicity of the various chrome compounds. The claim that chromite ore is non-carcinogenic because lung cancers have not been observed among chromite

miners is open to question, since no reliable data exist on the incidence of such tumors among chromite miners. Because of the location of most of the chromite mines in more remote parts of the globe, it is moreover not likely that valid data on this point can readily be obtained. Conclusions drawn from such evidence may be not only incorrect, but also directly misleading. This fact is strikingly illustrated by the complete lack of positive data on the occurrence of lung cancer among English chromate manufacturers (Baetjer),[1d] although it can be assumed with a great degree of certainty that the English chromate workers suffer from the same cancer hazards which affect their German and American colleagues.

The extremely low solubility of chromite ore mentioned by Koelsch[6] as the reason for the non-carcinogenicity of chromite dust is an argument of rather doubtful merits. General experience in occupational and experimental carcinogenesis demonstrates that cancers develop where specific agents act upon tissues over prolonged periods of time, although the actual quantities of such agents may be relatively small or even minute. From this viewpoint the low solubility of chromite ore in the lung tissue would rather favor a carcinogenic action by chromite dust than by the readily soluble chromate compounds. In support of this concept is the fact that the ulcerative lesions of the skin and nasal septa so frequently seen in workers coming in contact with chromate dust and chromic acid mist have not given rise to cancerous reactions.

It is not unlikely that this apparent non-carcinogenicity of soluble chromium compounds for the skin and nasal mucosa may be in part attributable to their comparatively transitory presence in the tissues of the ulcerative lesions. Their removal from such sites is accomplished by the sloughing off of necrotic tissue and by the secretion of tissue fluids oozing from the ulcerated surfaces as well as by direct absorption into the organism. Although the conditions present in the bronchial tree may not be quite so favorable for the removal of inhaled chromates as those present in the surface linings, it is not probable that such differences are of fundamental nature and would satisfactorily account for the localization of the occupational cancers among chromate workers in the bronchial ducts.

In vitro tests with chromite ore have shown, moreover, that this material apparently is soluble in blood to a limited degree, although definitely less so than some other soluble chromium compounds (Table III). Further studies referable to chromium in human blood have been made and will appear in a separate publication.

Likewise, chromium determinations performed on the blood of chromate workers employed in various departments, some of whom were exposed mainly to the inhalation of chromite ore dust, showed appreciable blood chromium levels, not only during the period of their employment but also after several months of cessation of work.[10] Similar relations were observed in the urinary chromium content of these workers. There is, thus, evidence that chromium is released from depots in the body over long periods of time and that this excretion is apparently maintained from foci containing chromium in a relatively insoluble form, such as chromite ore dust would represent.

TABLE III.
SOLUBILITY OF CHROMIUM IN CITRATED HUMAN BLOOD

No.	Substance	Total Amount Added	Amount Found per ml. of Plasma (as Chromium)	Amount Found per ml. of Washed Cells (as Chromium)
1.	Chromium Metal (Powder)	1.98 mg.	0.000 mg.	0.017 mg.
2.	Chromium Metal (Powder)	1.59	0.001	0.014
3.	Chromium Ore (Powder)	2.02	0.000	0.010
4.	Chromium Ore (Powder)	1.01	0.001	0.012
5.	Stainless Steel (18-8 Granular)	500.	0.001	0.021
6.	Stainless Steel (18-8 Granular)	500.	0.001	0.021
7.	Cr_2O_3 (Powder)	0.83	0.000	0.018
8.	CrO_3 (Powder	0.82	0.001	0.018
9.	$Cr(NO_3)_3.9\ H_2O$ (Crystal)	3.85	0.000	0.019
10.	$Cr(NO_3)_3.9\ H_2O$ (Crystal)	3.85	0.000	0.015
11.	$K_2Cr_2O_7$ (Crystal)	2.82	0.002	0.045
12.	$K_2Cr_2O_7$ (Crystal)	2.82	0.002	0.040

Varying amounts of a number of chromium-containing substances were added to citrated human blood and shaken at room temperature for periods ranging up to 16 hours. Analyses of the cell and plasma fractions showed that all of these forms were soluble to some extent. In all cases the greater part of the chromium was found in the cell fraction of the blood. Table III shows some of the results obtained. The chromium containing substances were added to 10 ml. of blood and the whole was shaken for 16 hours at room temperature. The blood was then centrifuged, and the plasma was separated and analyzed. The cells were washed four times with 0.9% saline solution, centrifuged, 1 ml. of the center portion was taken, laked with 14 ml. of distilled water, let set overnight at 5° C. centrifuged, and the upper 10 ml. of the 15 ml. were analyzed. All determinations were made polarographically. (The amount of chromium lost to the saline wash solution was not measured.)

4. Post-Mortem Studies

ADDITIONAL support for the concept that chromium stored in the lung furnishes a reservoir from which this metal is released over periods of many months or even years after cessation of exposure was supplied by chemical analyses and histologic examinations of the organs of three former chromate workers, two dying from bronchiogenic carcinoma, the third from a cancer of the bladder.

In the case of T. G., who had had no active contact with chromium for a period of three years and five months previous to his death, the post mortem examination listed the following changes: Round cell carcinoma of the right main bronchus with extensions into left lung, and right and left pleura; metastases in right ilium and adjacent muscle tissue, liver, mediastinal, tracheobronchial, portal, pancreatic, cervical, and periaortic lymph nodes and right adrenal, per-

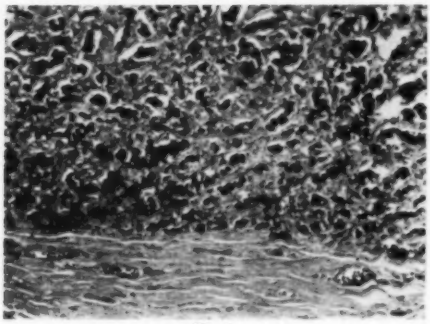

Fig. 1.
Abdominal lymph node with diffuse invasion by small hyperchromatic cancer cells appearing in narrow strands in a fibrous stroma.

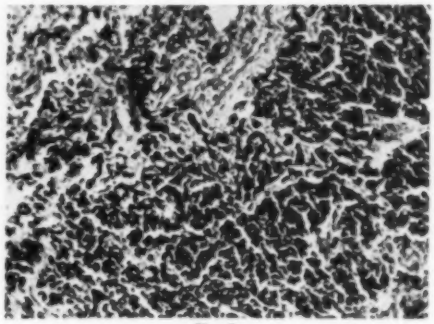

Fig. 2.
Masses of small, round and spindle-shaped hyperchromatic cancer cells infiltrating pulmonary tissues which contains black, amorphous chromite dust.

forated nasal septum, myocardial scarring, moderate arteriosclerosis, testicular atrophy (Fig. 1). The chemical analysis of the various organs, secreta, and excreta for chromium gave the results shown in Table IV.

The second chromate worker, G. E. F., employed for eight years, who was exposed to insoluble chromium for 2.45 exposure years and to soluble chromium for 2.27 exposure years (total 4.72 exposure years), came to autopsy nine months after his last chromate exposure.

TABLE IV.
CHROMIUM CONTENT OF ORGANS, SECRETA, AND EXCRETA OF CASE T. G.

Tissue	Micrograms of Cr/10 Grams
Surgical Specimens:	
Supercl avicular lymph node, part A	4.2 ± .2
lymph node, part B	1.2 "
lymph node, connective tissue	3.1 ± .3
Autopsy Specimens:	
Hair from top of head	3.1 ± 0.5
Thyroid, left lobe	2.4 ± 0.1
Larynx	2.1 (est.)
Left lung, left side upper lobe	380.0 ± 10
Left lung, right side upper lobe	456.0 "
Left lung, lower lobe	330.0 "
Tumor in left lung	26. ± 0.2
Heart muscle	1.3 ± 0.1
Aorta	0.3 "
Stomach	0.4 "
Small intestine	0.5 "
Fecal contents of small intestine	0.1 "
Large intestine	0.4 "
Fecal contents in large intestine	1.4 "
Pancreas	2.0 "
Adrenal	2.9 ± 0.2
Spleen	1.3 ± 0.1
Liver	0.7 "
Tumor in liver	0.2 "
Bile	0.05 ± 0.05
Abdominal lymph nodes } metastatic	2.4 ± 0.1
Portal lymph node } metastatic	8. ± 0.7
Normal appearing lymph node	0.4 ± 0.2
Fat around lymph node	1.0 ± 0.1
Right kidney	0.9 "
Bladder	0.3 "
Prostate	0.2 "
Left testicle	1.8 "
Left rectus muscle	0.5 "
Omentum	0.5 "
Subcutaneous fat	0.5 "
Skin	0.5 "
Cartilage	0.6 (est.)

The organs which were studied histologically and chemically showed the following post-mortem findings: Squamous cell carcinoma of the urinary bladder with extension to recto-peritoneal tissues of pelvis, to sacrum and ilium, bilateral pyonephrosis and nephrolithiasis, chronic cystitis and ureteritis, and broncho-pneumonia. The results of the chemical analysis of the organs for chromium are listed in Table V.

Chemical analyses were performed on a number of organs of three bodies, as controls. The results are presented in Table VI.

It is evident that normal tissues from non-exposed individuals may contain small amounts of chromium, just as benign and malignant tumors of various kinds obtained at random

TABLE V.
CHROMIUM CONTENT OF ORGANS OF CASE G. E. F.

Tissue	Micrograms of Cr/10 Grams
Specimens:	
Right lung	256. ± 10
Heart muscle	1.9 ± 0.1
Aorta	0.3 "
Thyroid	5.3 "
Left adrenal	7.6 "
Spleen	0.0 "
Liver	6.3 "
Stomach	1.1 "
Voluntary muscle	1.9 "
Bladder tumor	10.0 "
Spine	0.4 (est.)

TABLE VI.
ANALYSES OF AUTOPSY AND SURGICAL SPECIMENS OF NON-EXPOSED INDIVIDUALS

	Micrograms of Cr per 10 grams of tissue ± .05		
Tissue	Case (1) Age: 42 White male	Case (2) Age: 50 White male	Case (3) Age: 3 mo. White male
Kidney	0.2		0.0
Lung	3.0		0.0
Stomach	0.0		
Liver	0.1	0.1	0.0
Muscle	0.0		
Brain	0.0		
Lymph node	0.0	0.1	
Spleen	0.1	0.0	0.0
Adrenal	0.0		

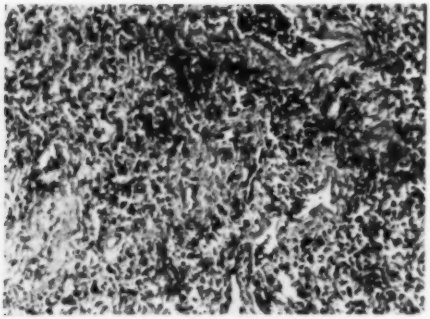

Fig. 3.
Chromite pneumoconiosis showing thickening of alveolar walls and hyalinosis and fibrosis of interstitial tissue with chromite deposits (lung cancer case No. 1).

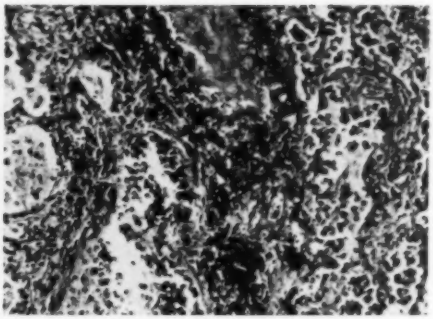

Fig. 4.
Marked chromite dust deposits in lung with thickening of alveolar walls (bladder cancer case, G.E.F.—see Table V).

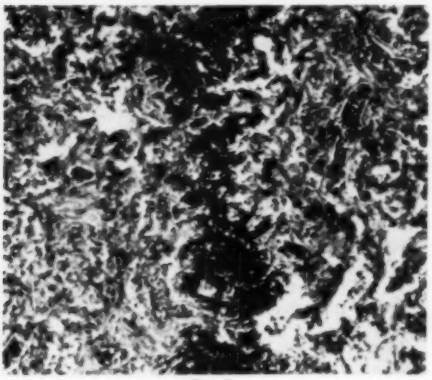

Fig. 5.
Dense, black chromite dust deposits in lung with generalized thickening of alveolar walls (lung cancer case No. 2).

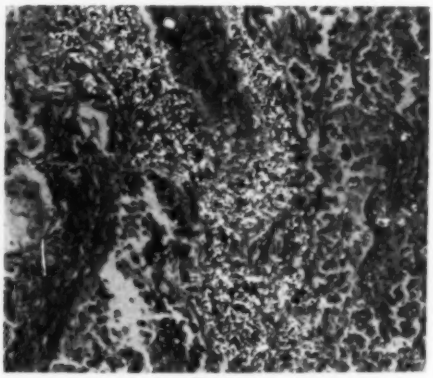

Fig. 6.
Chromite dust pigment photographed with polarized light, showing the optical differences between amorphous and crystalline material (compare with Fig. 4).

have been demonstrated to contain chromium.[9a-c] However, the absolute amounts present in the organs of non-exposed individuals are small.

The necropsy and histologic study of the third case, E. S. M., showed a bronchiogenic round cell carcinoma of the right main bronchus extending into the esophageal wall, metastasis in the adrenal and the pancreas, atrophy of the testis, glandular hyperplasia of the prostate, eosinophilic hyperplasia of the anterior part of the hypophysis (Fig. 2).

The histologic examination of the lungs of the three former chromate workers revealed that in all three cases moderate to large amounts of an amorphous black pigment were embedded in the interstitial tissue of the lungs. The interstitial tissue and interalvealor septa in such areas were thickened, fibrotic and hyaline. This pigment remained unchanged when the sections were incinerated and gave a positive spot test for chromium (Figs. 3-6). Since there can be little doubt that the black pigment represents chromite dust, it is evident that this chemically rather inert material elicits nevertheless a fibrosing reaction in the pulmonary tissue having the character of a spotty, moderate, but not nodular pneumoconiosis.[8] The stroma of the cancer tissue, on the other hand, exhibited either a complete lack of pigmentary deposits or only relatively small amounts.

Both chemical as well as histologic evidence thus indicates that the lungs of chromate workers are the chief depot of chromium compounds. All other organs contain in contrast to the lung relatively small, although significant, amounts of this material. The comparatively smaller amounts of chromium in the pulmonary cancer tissue is readily explained by the fact that the destruction of the pulmonary tissue by the cancer cells brings about a mobilization of the dust particles. Chromium is then apparently transported to the regional lymph nodes in the neck

and upper abdomen, which for this reason have a relatively higher chromium content. The absolute amounts of chromium demonstrated in the lungs of the two workers are of definitely lower magnitude than those previously reported by Alwens and Jonas.[11]

The chromium content of the hair and fecal matter suggests that both the skin and the intestinal mucosa, in addition to the kidney, may act as organs of chromium excretion. The relatively high chromium content of the thyroid and adrenal is noteworthy, and may have clinical significance, and, therefore, should deserve attention in future studies of chromate workers. Somewhat surprising is the rather high chromium content of the bladder cancer. Although it is uncertain whether chromium may have had any causal relation to this tumor, it may be wise to extend future chemical studies to all cancers occurring in chromium workers, especially to those located in the organs of normal excretion, such as the urogenous and gastrointestinal tracts.

While the evidence incriminating chromite ore as a potential carcinogenic agent that when inhaled may cause cancer of the respiratory organs is at present not conclusive, it is of sufficient weight to deserve serious consideration in future epidemiologic studies of lung cancer that might be related to environmental and occupational exposure to dust of chromite ore or other not readily soluble chromium compounds (chromium pigments, chromium alloys).

Conclusions

1. AN EPIDEMIOLOGIC study of lung cancer deaths among the workers of a chromate plant showed that the lung cancer death rate for all deaths is among chromate workers approximately 15 times that of the general population living in the county in which the plant is located. This occupational group representing 1% of the labor force of the County accounted for 10.8% of the total respiratory cancer deaths recorded by residence and occurrence in the County over a 12-year period.

2. The geometric mean latent period of the respiratory cancers in chromate workers was 10.6 years, i.e., about five years less than the average latent period reported in previous German and American publications.

3. Epidemiologic, biochemical and histologic evidence is advanced suggesting that insoluble chromium compounds, such as chromite dust and chromic oxides (or other insoluble chromium compounds), may play a causal role in the production of lung cancer because dust of insoluble chromium compounds is retained over long periods of time in this organ, and may cause there the production of pneumaconiotic changes.

[ACKNOWLEDGMENT: This project was made possible by a cancer control grant from the National Cancer Institute, U.S. Public Health Service.]

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Attitudes Which May Be Adopted in the Dubious Compensation Claim in California

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INTRODUCTION of workmen's compensation laws has, in four decades, resulted in initiating powerful forces which have altered and are continuing to alter the economic status, the sociological relationships, and the systems of belief of the entire employed population, all employers, all insurance carriers, and large segments of the medical and nursing professions. It seems to this author that the magnitude of these changes has not been fully realized, and that most of the forces contributing to the total changes have not yet reached their ultimate effect.

It probably will be a generation before the social scientists will present us with a truly complete and objective account of the interacting forces which are profoundly affecting the total employed population in the United States. The object of this paper is to offer some tentative opinions which we hope may prove to be of assistance in orienting ourselves as physicians in this still changing pattern of social forces.

California initiated workmen's compensation insurance in 1911, being one of the earliest states to do so. In its present form, under the extensive revision in 1917 of a more comprehensive Act adopted in 1913, the California law is one of the most liberal laws in the 48 states, allowing unlimited medical care, relatively high compensation indemnity, including an "aggravation of a pre-existing condition" clause, and resolving the benefit of doubt in favor of claimants. The word "injury" applies to any occupational disease. These liberal factors are generally accepted as positive values and worthy of perpetuation.

In this paper we shall point out some trends which are believed by many observers to be inimical to the best long-term interests of the Act and its beneficiaries, as well as to the medical profession, and we shall offer some explanations as to why they have come into play. We shall frequently use the words "liberal" or "liberalization." These words have no fixed value, positive or negative, and the reader must assess the values to be attached to them according to their application in the text.

One has but to be familiar with the compensation laws of some other of our 48 states to realize that California has indeed a liberal Compensation Act. Some states, for instance, limit the total cost of medical care to some sum such as $500.00, which amount can be used up very readily in two or three days of hospitalization as a result of a serious injury. Californians may be justly and properly proud of this liberal Act. Let it be emphasized, then, that this paper is not intended to criticize the California Workmen's Compensation Act nor meant in any way as an appeal to return to the "good old days"—as the good old days before the compensation laws existed were most certainly not so good for the injured employee. How bad they were is beyond the memory of the present younger generation. Industrially injured employees did not have even a remotely fair opportunity of being restored to health or of being supplied with sustenance without a court fight in which both the common law defenses and the court procedure were hurdles they could seldom overcome.

Legal and claims authorities state that the Act is administered under a philosophy described as "liberal interpretation of the law." The liberality of the Act and the liberality of its interpretation are clearly and interestingly documented by Edmund Thomas,[1] Chief Counsel of the State Industrial Accident Commission, San Francisco. His article, in an excellently worded paragraph, points the need and justification for the Compensation Insurance Act, and how it ". . . . became the social policy of California to provide a means whereby substantial justice could be accomplished in all cases expeditiously, inexpensively, and without encumbrance. As part of that policy, it is provided by law that the benefit of any doubt must be given to the injured employee."

Most Americans, whether physicians or laymen, understand that fellow citizens in an unfortunate situation are customarily given the "benefit of any reasonable doubt." When it becomes more generally understood that under the Compensation Act—as currently interpreted, at least, by the Industrial Accident Commission's Counsel—the claimant must be given the benefit of "any doubt," a partial explanation will be supplied for awards in favor of applicants whose claims appear rather dubious.

A more complete explanation of awards which sometimes puzzle physicians lies in the statement made frequently by Compensation authorities but difficult to find in print—in medical literature, at least—that the Compensation Law is administered not only with "liberal inter-

Read before the Section of Industrial Medicine and Surgery, at the Eightieth Annual Session of the California Medical Association, Los Angeles, May 14, 1951, and, through the cooperation of the Editors of *California Medicine*, published simultaneously in that Journal and this one.

pretation of the law," but also with "liberal interpretation of fact." Thomas illuminates this point in a continuation of the paragraph above quoted: "Likewise, since the applicant in proceedings before the Commission is frequently an injured employee acting on his own behalf without legal aid, the rules of evidence were relaxed for his benefit. Therefore, in proceedings before the Commission the technical rules of evidence, particularly the hearsay rule, are not enforced, and rather wide latitude is permitted. The injured employee cannot be expected to procure medical reports from experts or specialists, but generally must rely upon reports of his family doctor or an attending physician who may not have the facilities for preparing an elaborate report. Consequently, injured employees are given benefits and considerations which are not accorded plaintiffs in the civil courts."

The foregoing paragraph deserves some illustration. Most physicians who have treated any appreciable number of industrial injuries are familiar with the type of case where pathology, not necessarily nor even usually caused by trauma, is demonstrated and disability exists—and yet there has been nothing in the history to account for any causal relationship between the employment and the pathology. Moreover, there may have been repeated denials to the attending physician and to consultants, and to representatives of claims departments, of any accident, incident or event—and these denials may have been repeated many times over a period of many months. The award, when finally granted after a hearing before the Industrial Accident Commission, is based on the "fact" that the claimant at his hearing recalled a specific incident on a specific date at a specific time—not one detail of which had been recalled, but on the contrary had been denied many times previous to the hearing. This is a simple example of the "liberal interpretation of fact."

The same "liberal interpretation of fact" is applied to symptoms. A claimant who presents an apparently healed fracture in perfect alignment without any demonstrable disability of any kind, and which the final clinical note describes as "well," may be granted an award on the basis of a statement of pain or some other undemonstrable complaint.

Most California readers are familiar with the "aggravation of pre-existing condition" clause, and so it is not necessary to elaborate on the statement that this clause is being interpreted much more liberally than in the 1930's.

To illustrate the increased liberality in the administration, J. H. Thompson[2] discusses myocardial infarction. Referring to liberalization by statute he states, "The so-called Presumptive Act of the State of California is such that heart disease or pneumonia developing in the fireman or policeman is accepted as an industrial illness unless unequivocably proved otherwise." Also pertinent to our subject is a paragraph of his summary which states, "It has been pointed out that from the standpoint of industrial medicine the acceptance or the non-acceptance of the industrial origin of an injury or an illness is determined by the legal profession and public opinion, as this is carried out by the administration at state and possibly national levels. The gradual inclusion of more and more clinical conditions as industrial injuries is well known to all of us and the example of myocardial infarction is used to illustrate the progress being made toward this end."

This underscores the pressure on the practicing physician of today to ignore the application of scientific knowledge of etiology, and instead of offering a sound medical opinion which he should be qualified to express, to substitute an unsound legal opinion which attempts to anticipate the currently fashionable decisions of the Industrial Accident Commission. These are indeed unstable criteria on which to base a diagnosis. If he chooses to continue to express a medical opinion based on sound medicine, he risks being publicly overruled as being antagonistic to the patient's welfare and out of harmony with the philosophy of the administrative body to whom the report will be presented—and appearing to have caused treatment to be delayed until after the hearing. If he attempts to compromise between sound medicine and fashionable decisions, he will undergo a frustrating experience.

IT IS because of these situations that the physician appears to have a most legitimate interest in the philosophies of compensation claims administration. Medical principles dictate a scientific approach to the facts, and these facts if well established medically may not be distorted or altered because of expediency. This is of vital importance to the physician, and is of vital importance to the practice of medicine. Later we shall make further comment on this subject.

If it be stipulated that a liberal compensation law is being administered with liberal interpretation of the law and liberal interpretation of fact, is there a reasonable explanation as to why this compounding of liberalization has come about?

A most plausible explanation is at hand when one considers that there are three types of unemployed for whom relief by law has been made available. These three are:

1. Those who are unemployed because of industrial injury.

2. Those well people for whom employment is not available.

3. Those who are unemployed because of non-industrial disability.

Relief by law in California has been supplied for all three classes in the order in which they are listed above. The Workmen's Compensation Law for the relief of industrial injuries was passed originally in 1911 (financed at employer's

cost), whereas the relief for the unemployed through the State Unemployment Insurance Act did not follow until 1938 (presently financed at employer's cost), and the Unemployment Disability Insurance for those suffering from non-industrial disability became effective in 1946 (at employee expense unless the employer elects to contribute).

For 35 years—from 1911 to 1946—a disabled claimant appearing before the Industrial Accident Commission was either granted an industrial award, or he was left dependent on his own resources, in the lack of which he became indigent. This constituted such a powerful appeal to administrators that one could not feel that any great over-all social injustice was done if considerable latitude and liberality were exercised in classifying many extremely dubious claims as being industrial.

In other words, we believe that liberality of interpretation, both of the law and of the fact, sprang up for very natural reasons and was an inevitable reaction to fill the vacuum created by need. Insofar as the vacuum is now at least partly filled by the current Unemployment Insurance and Unemployment Disability Acts, the social justification for over-liberalization (if such has existed) should be diminuendo. Some social pressure for liberality may still exist if decisions are influenced because the benefits of the Compensation Act are considerably greater than those of the Unemployment Disability Act and by the fact that it is employer rather than employee funds which are to be expended under the compensation award.

If it be granted that these rather superficial, over-simplified observations are correct, one may legitimately ask why they concern the physician. We believe that our further discussion will explain and justify his concern.

One profound effect of the introduction of the Compensation Law has been to alter the doctor-patient relationship by the introduction of the third party. In compensation cases, this third party is the employer, to whom is usually added the fourth party—the insurance carrier—and in the disputed claim there is the fifth party, the Industrial Accident Commission.

Patients who have suffered industrial injuries seem, on the basis of their attitudes, to fall into three types which may be classified as follows:

A. Those whose ability to work is viewed realistically in terms of the actual physical disability, job requirements, and the therapeutic needs. (This is the normal, healthy attitude.)

B. Those whose emotional attitudes cause resistance to work, which the actual physical disability does not justify. (This is unhealthy and is generally recognizable, at least when it exists to any degree.)

C. Those whose emotional drives to work are so strong that their insistence on working is unrealistic in terms of actual disability, of job requirements, or of therapeutic needs. (This may be more frequent than is recognized, and, at least in its extreme, may—like attitude "B"—be unhealthy.)

Also, parenthetically, it should be remarked that the same patient does not necessarily stay in the same class during the entire length of the claim. Occasionally, the intrinsic mental dynamics of the patient will undergo a change. At other times either skill or awkwardness in the physician's handling of the patient or in the layman's processing of the claim will alter the attitude. This is important as a reminder that efforts should be directed to maintain the healthy attitude of the one class, and to alter beneficially the attitude of the other two.

Ordinarily, compensation cases in Class "A" do not constitute any major problem in medical or claims administration. Neither do those in Class "C" usually find it necessary to become involved in any type of dispute to obtain their rights. In Class "B" fall the majority of cases which cause the greatest difficulty in the diagnostic, the therapeutic and the claims field. When awards based on expediency are granted, the beneficiary is most likely to be one of this group.

The scope of this paper will not allow a full discussion of all the possible dynamics which cause patients to fall in Class "B." It might be mentioned, however, that in this class may be found those who carry hostilities or anxieties of any kind, or are insecure from any cause. The dependency on a compensation award may lie in a work situation to which the claimant is poorly adjusted and from which he wishes to escape, or it may be a reflection of a basic inadequacy totally unrelated to any work situation. Occasionally, one can clearly discern the effect of what Freud describes as "the advantages of an illness," but since the economic, the social, and the psychic maladjustments may be so interwoven, skilled psychiatry may be required accurately to uncover the mental dynamics causing the dependency. At any rate, I would project that a well-integrated individual is seldom found in Class "B," and if found, that he will seldom remain in this category for long. Also, I believe that patients can be removed from Class "B" and promoted to the healthier Class "A" in direct ratio to the psychiatric or psychosomatic interest and skill of the attending physician. Laymen also—be they supervisors, employers, claims agents, business agents or any others involved in the handling of the claim or in contact with the claimant—may also materially affect the claimant's emotions to his benefit or detriment.

As a subject for practical research for both physicians and social scientists, the thorough and complete study of Class "B" should offer an interesting challenge. The spectrum of those in this class should be found medically to pass from actual malingering through psychoneurosis and psychosomatic conditions to the purely organic conditions which if demonstrated would reclassify the patient as belonging in Class "A."

The social scientists involved in such a thorough study should include those versed in the practical aspects of the disciplines of economics, psychology, sociology and cultural anthropology to supply all the contributions necessary to analyze the environmental pressures causing the psychic or psychosomatic phenomena.

Granted that such a study, if thorough, would be an ambitious long-term project, its contribution to the substantialness of justice would be tremendous. Of course, with varying degrees of success, there are efforts now to present a complete picture of individual cases, but the Commission is still too frequently compelled to depend upon the use of intuition in rendering a decision. We are not idealistic enough to believe that all the sciences collectively will ever abolish the need for intuition in forming a judgment. We do believe, however, that the necessity for its use in considering claims may be minimized if the potentialities of a cooperative study by the social sciences are ever realized.

The well recognized so-called "arbitrary Award," very closely related to or synonymous with the intuitive award discussed in the foregoing paragraph, perpetuates itself and multiplies by inviting more claims which result in more awards of a similar character—and there is now a common belief that any claimant who has been injured is "entitled to something" over and above medical care and compensation for the period of temporary disability.

To return to the subject of "liberalization of fact," we believe that medical statements as to cause and effect (the etiology of the pathological condition) must be based on medical facts and medical principles, and that these facts may not be stretched or altered because of expediency. The house of medicine will collapse entirely if etiology—one of its cornerstones—is to be subject to personal or social expediency. When the weight of medical authority states that beyond a reasonable doubt a given clinical syndrome is "X" disease, it would seem only reasonable that this and all identical cases should be invariably classed as "X" disease. When the administrative authorities of the state find it mandatory by statute, or expedient through interpretation of the law or through interpretation of fact, to render a decision which cannot be overruled by any court that a claimant suffering from this condition be labeled not as "X" disease, but as "Y" injury, a chain reaction is begun which will have serious long-term effects on the practice of medicine—and this event should cause concern.

Let us be honest in our appraisal of our own contribution as individual physicians, however, to these decisions which we collectively deplore. The Industrial Accident Commission must have some justification for its decisions and usually, if not always, there is a report from some doctor which either intimates or states that "X" condition might be "Y" injury. It is not unusual to see a two-page medical report describing "X" condition ending with one sentence saying in effect, "Of couse 'Y' injury is possible." Frequently the medical examiner is unconsciously ambiguous, and he is unaware that a single sentence has nullified the intent of his entire report. In other cases, however—owing to an understandable sympathy for his injured patient—he deliberately goes out of his way to assist him to the extent of indicating an impossible medical situation. This contributes most materially to making it possible for a legal finding to be made, asserting what may well be a medical impossibility. We of the medical profession must not adopt too self-righteous an attitude toward those who sacrifice principle to expediency, because we ourselves have not unanimously proved immune to this powerful influence.

It has frequently been advocated that a medical board be established within the Commission to evaluate the medical aspects of all claims. This procedure is established in some other states, and its proponents claim it has practical value as well as theoretical merit.

Those who profit by awards through expediency should not, in the long term, suffer loss if the tide is reversed and principles become paramount over expediency. Expediency which wins benefits through social pressure can ultimately work against present beneficiaries when the pressure of expediency becomes great enough from another quarter. It would seem fair to state that long-term, consistently fair, uniform distribution of benefits will be assured only if all concerned—administrator, physician and beneficiary—understand the fundamental principles involved, honor them, and respect the procedures established and based upon them. The tenure of the personnel on today's scene is limited, at the longest, to their lifetimes. Viewed over this relatively short span, the long-term effects of expediency versus principle may not seem serious. Respect for the long-term true interest of whatever administrative, professional, or labor group to which any of those concerned owe their allegiance, seems to dictate a conscientious recognition and honoring of sound principles. I believe it is to the benefit of all these groups to attempt diligently to identify them.

WE HAVE discussed in some detail the attitudes of the injured, the Commission, and the physician. That we have mentioned only casually, if at all, the other groups equally involved in this total situation—the employer, the insurance carrier, and the labor union—does not mean that they are detached from the situation. In their own areas they are subject to similar conflicting pressures of expediency versus principle.

In any situation involving conflicts of beliefs and attitudes between groups, the social "law of the vicious cycle" operates, and either regression or improvement in the attitudes of any of the parties concerned will influence the po-

sition of all other parties on the spiral, upward or downward. Since we believe that the Industrial Accident Commission, the clearing house for all claims, is in a position of greatest leverage to change attitudes towards dubious claims, we have stressed its part in the total situation.

We question whether the dominancy of expediency over principle, insofar as it be evident in the compensation insurance field, is primarily a problem of this field, and suggest that the phenomenon is merely a reflection of a nation-wide pattern in all areas of American life.

The first Social Security program of the compensation insurance type was introduced in Germany at the time of Bismarck, and it was 60 years before its costs showed any appearance of beginning to level. The costs in California have risen much more rapidly in much less time, and the upward trend seems to be proceeding with little diminution of speed.

Social scientists, in personal discussion, have pointed out that the Germans—at least during the period referred to—had a rather universal respect for authority, both individual and institutional. The modern American attitude, on the other hand, was contrasted as being increasingly, for at least 40 years, in conflict with authority (or restrictions by authority) of any type—whether personal or institutional, governmental or corporate, temporal or religious. The replacing of old-time principles of personal integrity with the motto of "It's all right if you can get away with it," is beginning to honeycomb all levels of American life in too many areas of social existence.

The corollary of this, at the administrative level, is the generally enlightened attitude toward social obligations during the last half century. This has resulted in accelerated programs of supplying, directly or indirectly, financial assistance for many groups previously neglected. These programs have, in one generation, resulted in an entirely new concept by administrators—whether at national, state or county levels—toward the distribution of expendable funds, public or corporate. The continuation of such enlightened programs must inevitably depend upon public support. Factors which weaken public support may be economic, social and political. In the administration of all such programs, it should be borne in mind that public resistance, always present in some degree, may swell to great proportions if a tide of criticism justified economically or socially, be fanned by strong winds of political prejudice. The situation will then become subject to the "all or nothing" principle, and the partisans divided into "all for it" or "all ag'in' it" groups. A careful approach to the whole problem on a deeper basis, studying each individual facet of the total situation should be of great service in insuring perpetuation of the positive values in what we believe is a soundly liberal workmen's compensation insurance act.

IN THIS paper we have taken two views of compensation laws. The first was as a substitute for common law in adjudicating claims for industrial injuries. We have discussed the California Act from this point of view and have pointed out what we consider both favorable and unfavorable aspects of the administration and procedures in connection with it. We anticipate no difficulty on the part of administrators, physicians or lawyers in understanding our comments, because of the highly technical and specialized education afforded today in business administration, medicine and law.

We also, however, have discussed compensation acts from another perspective—namely, as being powerful social instruments. Our comments in this area have of necessity been more abstract and we do not anticipate as ready an understanding of our references to the potential contributions of the social sciences. As administrators, doctors and lawyers, most of us have not been sufficiently trained in the basic fundamentals of the social sciences adequately to understand and anticipate—let alone alter—social forces of the magnitude and with the momentum of these Acts.

Our generation has two courses open. The first is to confine our efforts to our purely professional role, allowing the ultimate pattern of compensation to end up willy-nilly, wherever it may be heading. The second is, to the extent of our ability, to orient ourselves in the basic principles of economy, clinical psychology, sociology and cultural anthropology, and be better—if not thoroughly—prepared favorably to alter the drift of the trends in compensation insurance. We will have valuable assistance in this if we step out of our ivory towers of practical experience and knock on the doors of the halls of learning and invite the interest of those who have the academic knowledge of these disciplines, but who now, too frequently, are isolated behind the ivy-covered walls.

FOR the next generation, however, I believe we should offer a better choice than either to ignore the social implications of their life work or awkwardly grasp for belated help I recommend that we insist that our educational institutions make basic courses in the social sciences mandatory for students of business administration and for the pre-medical and pre-legal students. If we do this, the next generation may, with greater facility, improve and perpetuate our present existing measures of financial aid, medical care and rehabilitation for the injured workman.

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Impressions of Industrial Medicine and Social Legislation in England, France and Holland

Part II—France and Holland

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France

AMONG the many interesting points that came to light during a visit to France was the fact that the French people are not given to advertising, either at home or abroad. Persons outside of the country, including some of the best informed in the industrial health field, could not understand why a student of this subject should want to spend much time in France and hinted that maybe an excuse was needed to justify a sojourn of two or three weeks in Paris. Similar views were expressed by native Parisians. They did not know what one could hope to learn, nor were they aware of the great advances that had been made in industrial health programs in their own country. As this dissertation progresses, it should become apparent that France is far ahead in certain phases of industrial health activities, and is perhaps the only country in the world which has taken the steps that are necessary if there is a true desire to have industrial health services provided for all employed persons. Because of the fact that the organization of these services in France is probably less well known in the United States than that of some other countries, it seems worth-while to present a brief description.

Ministry of Labor and Social Security, (frequently referred to simply as Ministry of Labor). Although a factory inspection service dates back at least as far as 1874, the present basic administrative organization was established in 1946. The Ministry of Labor now is concerned with working conditions, hygiene and safety of workers, labor-management committees, labor disputes, employment and placement, rehabilitation, vocational training, and assistance to unemployed workers. Enforcement of the various codes and regulations is in the hands of a corps of factory inspectors under an Inspector General. The country is divided into 14 inspection departments, each under a Departmental Inspector. Each department has at least one Medical Inspector in addition to the regular factory inspectors, and there are several medical inspectors attached to the Central Office of the Ministry of Labor in Paris. The Medical Inspector General is Dr. Bousser, and his assistants are Doctors Albahary, Laurent, and Melon. In addition to this full-time medical staff, there are a number of part-time medical inspectors, and a special group concerned exclusively with pneumoconioses. The medical inspectors have the right of entry and the right to examine workers in connection with the development of preventive measures. A system of apprenticeship and vocational training is highly developed under the supervision of the Ministry of Labor, and the health of apprentices and of young workers is carefully supervised.

One of the most interesting activities visited was that of the "Services de Main-D'oeuvre," a term which has no exact English counterpart. Each large city in France has a so-called Medico-Social Center, where the Services de Main-D'oeuvre are carried out. The administrative head of the center visited in Paris was Mr. R. Brin, a highly intelligent and socially-minded individual. All unemployed persons who seek unemployment insurance are sent to these centers for a medical examination. This includes medical and occupational history, physical examination, chest fluoroscopy or radiography, urinalysis, and hemoglobin determination. In addition, a number of tests of muscular strength and coordination are performed and in some cases, aptitude testing is done. Each individual so examined receives a "fiche de travail," which is actually a physical capacities profile. This is taken to the government employment office, and is used as a basis for placement. The applicant receives unemployment insurance until suitable work can be found. If he or she finds a job without the assistance of the employment service, the physical capacities estimation may not be available to the prospective employer. Theoretically, all job openings are supposed to be listed with the employment service and direct hiring is not supposed to be done, but there are situations in which this system does not operate.

The medico-social centers perform examinations not only on the unemployed, but also on apprentices, juveniles (under 18 years of age), and physically handicapped and displaced persons. When conditions requiring treatment are found, the subject is referred to an appropriate hospital or clinic. Through the Services de Main D'oeuvre, the Ministry of Labor has assumed responsibility for performing large numbers of pre-placement examinations, for applying selective placement techniques, for supervising the health of young workers and for a significant

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part of a nationwide rehabilitation program. It was not possible, through personal observation, to determine the extent to which this program is actually in operation. There was convincing evidence, however, that in Paris it is working well and that the same is true in at least some other parts of the country.

Social Insurance. The social insurance program is administered by the Ministry of Labor and Social Security and covers health examinations, sickness insurance, chronic illness, maternity, disablement, old age, death, unemployment, occupational injuries and illness and family allowances. Most of the benefits are financed through contributions amounting to 16% of wages, of which 10% is paid by the employer and 6% by the employee. The contributions apply only up to 22,000 francs of monthly income (about $62 in 1950) so that persons with higher incomes pay only on the first 22,000 francs. The family allowances are financed by an additional fixed tax paid entirely by the employer. Benefits for industrial injuries are also financed by employer contributions, but at a rate which varies according to the nature of the work. It is ordinarily approximately 1% of wages. Occupational disease benefits are paid only for those diseases which are listed in a schedule. Common law suits are permitted in cases of occupational illness not covered by the schedule. A permanent committee of consultants advises the Ministry of Labor on the question of adding to the list of compensable diseases and is now considering the addition of beryllium poisoning. Partial disability, ranging from 20% upward, is recognized in cases of silicosis.

The sickness insurance program is of special interest. It embraces payment of physicians fees and for drugs, prostheses, eye glasses, hospitalization as well as providing cash indemnity benefits. The method of paying for physicians services is most ingenious and has much to recommend it. The sick person selects his own physician and pays the doctor's bill. Most of the practicing physicians have agreed to a fee schedule worked out between the medical societies and the Ministry of Labor and Social Insurance. After paying the doctor, the patient submits the receipted bill to the sickness insurance office and is reimbursed for 80% of the scheduled fee for the particular service involved. The remaining 20% is known at the "ticket moderateur." The theory is that if the patient has to pay part of the fee, it will moderate any possible abuse of the system either by the patient or by the doctor. It is well known, of course, that fee-for-service treatment under a pre-payment medical care plan is likely to produce major difficulties of financing unless some form of "ticket moderateur" is applied.

Cash indemnity payments to persons who are unable to work because of illness are paid starting on the fourth day of disablement and may continue for as long as six months. Ordinarily the payments are equivalent to one half of the wages, but if the worker has three or more children he receives two-thirds of his wages. The upper limit of payments, however, is equal to one-half or two-thirds of the same 22,000 francs per month mentioned above.

Legislation Relating to Industrial Medical Services

A MOST remarkable piece of legislation was passed in October, 1946, and put into operation the following month. This law requires every enterprise, regardless of the number of employees, to organize and provide certain industrial health services for the employees. The apparent impracticability of complying with this law, and the difficulty of enforcing it quite naturally raise doubts in the minds of outsiders as to how far the French government can go in putting the law into operation. The skeptical visitor is bound to be impressed with how seriously the law is being taken, and how resourceful French employers and physicians have been in setting up appropriate programs. In fact, many physicians, including the Medical Inspectors of the Ministry of Labor, were quite surprised that anyone should see anything particularly startling in this law or should question the possibility of making it work.

Establishments covered by the law include all places where people work for wages or salaries, including government offices, schools, clubs, labor unions, and many other categories. The services are to be provided by one or more physicians who are to be known as industrial physicians (médecins du travail) and whose work is to be "exclusively preventive." It is expected that small establishments will get together to share a common facility and a physician.

The wording "exclusively preventive" which appeared in the original act, was responsible for an interesting controversy. According to the authors of the law, the correct wording was "essentially preventive." They claim that an error was made in printing the law resulting in "essentially" being replaced by "exclusively." As originally voted upon, the law included the latter word, thus creating an inconsistency in the law since one section, Article 15, gives permission to the industrial physician to treat certain minor disorders at the place of work when such treatment will result in the worker's remaining on the job. The medical societies pointed out this inconsistency to the government tribunal which resolved the matter by annulling the controversial Article 15. This aroused a storm of protest which resulted in the rewriting of the entire law and its subsequent passage with the original wording "essentially preventive," and the restoration of Article 15. The law specifically enjoins interference in the free choice of a treating doctor. In actual practice, workers choose their physician at will. Industrial doctors apparently confine their treat-

ments to the simpler ailments, much as is the case in England and in the United States.

Medical services which are considered to be the obligation of the industrial physician include:

1. Pre-placement examinations. (supplementing those at the "Services de Main D'oeuvre").
2. Periodic examinations. In general these are required annually, but the interval is shorter for young workers, pregnant women, handicapped workers, and those engaged in certain hazardous occupations.
3. Return to work examinations. These are prescribed for all absences of 10 days or more, and for those who have repeated absences. All examinations are to be done during working hours without penalty to the worker.
4. Treatment. The nature of these has already been described. Emergency treatments are, of course, also called for.
5. Supervision of the hygiene of the work place.
6. Consultation with the employer on changes of process and on the shifting of workers from one job to another.
7. Reporting cases of occupational disease and filling out all required forms.

The law prescribes in great detail the number of doctors and nurses required for any given number of employees in various types of establishments and also prescribes the amount of space and the equipment that must be made available. There is a long list of occupations which call for extra services and extra time on the part of doctors and nurses.

A most interesting and commendable system has been worked out for calculating the remuneration of the industrial physicians. The basis for this system is the eminently proper one that the better trained physicians should receive higher pay than those with relatively little training in the specialty of industrial medicine. Four categories of physicians have been established. The first, embracing those who do not have a diploma in industrial medicine, are paid at a rate which is six-tenths that of physicians in the fourth category, who possess a diploma in industrial medicine as well as certain other special qualifications. Categories two and three receive intermediate rates of pay. Because of fluctuations in the value of the franc and in the scheduled rates of payment for physicians' services, no fixed amounts of payment have been set. Instead, the current value of a "consultation" is used as the unit of payment. Thus, for each session of three and one-half hours the remuneration for industrial doctors in the various categories is equal to a certain number of consultation equivalents, as follows:

1st category	6 consultations
2nd category	7 consultations
3rd category	9 consultations
4th category	10 consultations

These rates apply to part-time physicians as well as to those who are employed on a full-time basis, but the latter may not be employed for more than 10 sessions of three and one-half hours each in any week. For sessions of shorter duration the pay is in proportion to the time. In the selection of industrial physicians, the employees as well as the employer have a voice through the so-called "comité d'entreprise."

Education in Industrial Medicine. The experience in France has shown that one way to create a demand for graduate and post-graduate training in industrial medicine is to prescribe premium pay for properly trained physicians. The principal training centers are located in Paris and Lyon, the former of which was visited. Here, about 700 students are enrolled for courses in industrial medicine! Most of these are part-time students who have or intend to seek part-time employment as industrial physicians. A number of experienced and highly competent teachers are available to provide instruction, but the unsettled economic conditions and the isolation of the country during the German occupation are reflected in the condition of the laboratories and libraries. Valiant efforts are being made to build these up in the face of great difficulties, not the least of which is the dollar shortage.

The course of instruction at the Institute of Industrial Hygiene and Occupational Medicine of the Faculty of Medicine of Paris is most comprehensive. It covers the growth and organization of modern industry and of labor unions, social legislation, industrial applications of psychology, environmental sanitation, organization and administration of government services, accidents and their prevention, occupational diseases, and rehabilitation. An occupational disease consultation clinic at one of the hospitals, under the direction of experienced and highly skilled physicians such as Doctors M. Gaultier and V. Raymond, offers a rich source of teaching material. Cases are referred by physicians and other clinics from all parts of Paris, resulting in a quantity and variety of patients quite beyond anything that exists in the United States.

There are several professional societies in the field of industrial medicine. One of these, the Société de Médicine et D'Hygiène du Travail, holds regular meetings in Paris where scientific reports of a high calibre are presented. This society is responsible for the publication of *Les Archives des Maladies Professionelle*, an excellent journal which should be more widely read in America.

Industrial Health Services. Perhaps the most interesting type of program being carried out in France is the so-called "interenterprise service," or small plant program. The law does not specify what type of grouping shall be made for these cooperative services, but the two most commonly adopted are those according to location

and those according to industry. Both types exist in Paris, and one of each was visited. The Ministry of Labor encourages the geographic type of grouping since it generally means that the physician providing the service has less traveling to do in order to pay regular visits to the plants, and also that the workers have easier access to the physician. If the interenterprise service does not have a center, examinations of workers are done at the place of work. Each interenterprise service is required by law to have a labor-management committee to establish general policy and handle the necessary arrangements for the operation of the service. This committee is responsible for the selection of the doctor who is to render the service.

The small plant program organized on a geographic basis which was visited is located in an industrial section of Paris. Originally the program was organized by a trade association of the paper box industry but subsequently other plants in the neighborhood joined the plan. At present, 30 plants, representing 13 different types of industry, participate in the program. The number of employees per plant varies from five to 240, for a total of about 3,400 workers covered. The costs of maintaining the service are defrayed entirely by the employers, each paying in proportion to the number of his employees.

This particular program has its headquarters in a district health center building which provides examining rooms, a laboratory, a treatment room, and other facilities. The principal activity is physical examinations—pre-placement, periodic, and return-to-work, but a certain number of minor injuries and illnesses are treated. Seriously injured cases are sent directly to the hospital from the plants. As required by law, special supervision is given to young workers, women, and those engaged in hazardous work. A close liaison is maintained with the Institute of Industrial Hygiene and Occupational Medicine which is called upon for special blood, urine, and air studies.

This particular program is carried out by a very charming and capable young woman physician, Dr. Colpaert. In addition to the services rendered at the center, she regularly visits each participating plant at least once a year and those plants in which chemical hazards exist are visited about every three months. A careful record is kept of all services and regular monthly reports are prepared for the interenterprise committee. These reports show the number and nature of services performed for the employees of each plant. If the physician becomes aware of working conditions that require correction the matter is handled through the interenterprise committee. In cases of difficulty, the factory inspection service steps in.

The second interenterprise service visited was one organized to take care of workers in the theatrical trades, including performers, musicians, stage hands, ushers, and others. This program is under the direction of Dr. Henri Desoille, who is also director of the Institute of Industrial Hygiene and Occupational Medicine, and who took on this job because of his great interest in the theater. Dr. Desoille is assisted by a number of part-time physicians.

The headquarters of the service consists of a suite of rooms set up for all types of examinations, including x-ray and special eye testing. The equipment for the center was donated by Maurice Chevalier, but the costs of maintenance and operation are paid for by the theater owners. No treatments are given at the center, but workers requiring therapeutic services are referred to private physicians or to appropriate clinics and hospitals. The doctors are assisted in their work by a staff of nurses, technicians, and clerks. Dr. Desoille stated that all theaters are required to have a physician in attendance at all performances, a fact which serves as an added inducement for physicians to participate in this particular program. The senior physicians are given first choice of the performances they wish to attend.

Mention has already been made of the legal requirements pertaining to the amount of physician time that must be provided for employed groups of various sizes and various composition. In any plant where the required amount of time reaches 150 hours per month, the employer is obliged to employ a full-time doctor and organize an autonomous program (service médical autonome).

Several programs in some of the larger plants were visited.

One of the outstanding industrial health services in France is that of the Ford Motor Company in France, manufacturers of the Vedette car. In visiting this plant, and its medical department, one has the impression of being in a typical modern American factory. The medical director, Dr. Auffret, is keen and well trained, and he has developed a program that could hardly be surpassed in its scope and quality. Dr. Auffret is particularly interested in applying selective placement techniques and has found that when this is properly done, the number of visits to the plant dispensary is greatly reduced. This can properly be interpreted as effective preventive medicine.

Another large plant program of interest is that of the utilities "Gaz de France" and "Electricité de France," under the able and imaginative direction of Dr. Barthe, one of the veterans of French industrial medicine.

At the gas works, an extensive program of research on chronic carbon monoxide poisoning is being conducted by the physician in charge, Dr. Jean Paris.

The Control Doctor. One feature of French industrial medicine which has developed as a direct result of social legislation is the complete separation of the preventive medical work and

the determination of when an employee who has been sick is able to return to his job. This latter activity is the function of the so-called Control Doctor. The Industrial Doctor and the Control Doctor may use the same facilities in a plant medical department but they are completely independent of one another. The theory in back of this separation is that the Control Doctor may at times be in conflict with the worker since the decision of the doctor determines whether the worker may remain away from his job and continue to receive his social security benefits. This type of conflict, it is felt, can impair a harmonious and confidential physician-patient relationship and consequently interfere with the most effective functioning of the preventive program. There is unquestionably much logic in this reasoning.

The concept of the Control Doctor is of particular interest at this time since it is one which is beginning to grow in the United States, although it is by no means entirely new. For many years, workmen's compensation boards have employed physicians whose sole function has been to determine whether injured workers had recovered sufficiently to permit them to return to their jobs. Compensation insurance companies have engaged consultants for the same purpose. State disability benefits laws make provisions for a similar type of control, either through physicians employed by the state or those representing employers. These controls are necessary in order to prevent abuses and to curb ill-advised and injudicious certification of disability by family doctors.

As has been said, the function of the Control Doctor is to protect the insurance fund against unwarranted claims. In France, the social insurance program is administered by the government, consequently the Control Doctor is employed by the government. With the growth of sickness disability legislation in the United States it is almost inevitable that the specialty of "Control Doctor" will become increasingly important. Since the work has a "police officer" tinge, it is not attractive. In France, many physicians accept this work on a temporary basis until they are able to find something more pleasant and constructive. This is a most unfortunate state of affairs, but it is one that can be expected to develop also in the United States. Actually a Control Doctor should have superior diagnostic acumen, a deep understanding of human behavior, a thorough knowledge of the physical requirements of various occupations and other special skills. It is doubtful whether the financial rewards for control work will be made commensurate with these exacting requisites.

The existence of the Control Doctor, who actually produces nothing in the way of constructive, preventive or therapeutic medicine, is one of the undesirable but necessary concomitants of a social insurance program.

Holland

SOCIAL INSURANCE. The most interesting features of the program are those relating to sickness benefits and medical services. Insurance is compulsory for all workers who earn less than 3,750 florins a year (about $1,000 in 1950). Voluntary insurance is available for those in the higher income brackets. In this connection it is interesting to note that the compulsory plans operate with a surplus and the voluntary plans with a deficit. The government has established a fund from the reserves of the compulsory plans to meet the deficits of the voluntary plans.

Although the sickness insurance for the lower income workers is compulsory, the scheme is not operated by the government. There is, however, close supervision of the insurance plans. Insured persons belong to one of a large number of "sick funds." The first of these sick funds were organized by the medical profession, and the Netherlands Medical Association still operates some of these plans. Other sick funds have been organized by fraternal societies, labor groups, and many other types of associations. Some of the larger industries have set up sick funds for their employees, in which cases the employees are obliged to belong to that fund.

As in England, physicians are paid on a capitation basis. All licensed physicians in good standing are eligible to participate in the scheme and patients have free choice. The doctors receive a fixed annual amount for each person on their lists. The question of payments to specialists is under discussion. At present, specialist services are not included in the insurance scheme, but hospital care is provided.

The administration of the cash benefits part of the program is somewhat separate from the medical care scheme, but in order for a sick person to collect sick benefits he must be a member of a sick fund. Naturally the sickness disability must be certified by a physician. The most amazing part of this program is that cash benefits for sickness disability amount to 80% of wages. This being the case, there is little wonder that the Control Doctor becomes an important person, although abuses of the benefit scheme are said to be relatively infrequent.

Factory Inspection. The country is divided into 10 inspection districts, each of which has a number of factory inspectors. There are five medical inspectors of factories under the direction of the veteran Dr. van Luijt, a kindly and charming gentleman. The medical inspectors work closely with the factory inspectors through whom orders are issued to plants when necessary. The medical inspectors are responsible for pre-placement examinations of all workers under 18 years of age, and for periodic examinations in certain hazardous trades. These young workers may not be employed unless they present a card showing that they have been examined. There are also pre-employment and periodic ex-

aminations for stone masons. The medical inspectors may require employers to provide for periodic examinations in any plants where they feel it is important. Another duty of the medical inspectors is to investigate all reported cases of occupational diseases. The central office of the inspection service in The Hague maintains a small laboratory for conducting industrial hygiene studies such as dust counting and air analyses.

The Philips Program. To do justice to this remarkable program and adequately describe its many facets would require a full-length dissertation. The Philips Company is the largest industrial organization in Holland. The main factory, located in Eindhoven, employs more than 25,000 persons in the production of electrical equipment of various types. The present medical program is part of a general social welfare scheme which had its origin more than 50 years ago. Even before 1900 there was a Sickness Benefit Fund, jointly supported by employer and employee, which provided cash benefits amounting to 70% of normal wages in the case of disability due to sickness. In 1900 a separate Sickness Fund was established which paid for medical attention by a family doctor. This pattern of two separate funds, one to provide cash benefits in partial replacement of lost wages, and the other to provide medical service benefits, later became established as part of the social insurance program for the entire country, as mentioned elsewhere in this article. With the passage of the Sick Benefit Act of 1930, it became necessary to modify the plan then in operation in the Philips organization. Under this law all employees earning less than 3,000 florins a year (subsequently increased to 3,750 florins) are obliged to become members of the Philips Sickness Benefit Fund. Contributions into the fund amount to 1% of income from employees and 2½% from the employer. Benefits payments are 80% of wages for a maximum period of one year. If an illness lasts less than 12 days, no payment is made for the first day in the case of breadwinners, or for the first two days in the case of single persons.

As part of the growing medical program, a dispensary was set up in 1925 to provide medicines and dressings for employees who were entitled to free medical assistance. Three years later, in 1928, the industrial health service was instituted. A booklet on the Philips social program states that the Health Service "has to attend to the general hygiene in the works and is charged with the medical examination of applicants, with the intention of making sure that every applicant is placed in a position in the factory for which he or she is physically most suited." Chest x-ray examinations were started in 1932 and were made compulsory for all applicants for employment. Employees are examined every 18 months and are encouraged to have members of their families examined as well. In 1939 the hundred-thousandth x-ray examination was done.

For a time the family medical service and the industrial health service operated independently, but in 1940 they were combined to form the Medical Department, under the direction of Dr. Burger. In this Department the previous organization is partly preserved in the two major divisions known as the Family Doctor's Service and the Social Hygiene Service. The Medical Department organization was maintained throughout World War II and the period of occupation although its headquarters, the so-called Polyclinic, was destroyed by bombardment in 1942-1943.

At the present time the Philips Medical Department has a staff of 20 full-time physicians, evenly divided between the family service and the industrial health service. In addition there is a "control" doctor who handles controversial cases involving the payment of sickness benefits. The family service provides general medical care for all employees and their families while the industrial health service is responsible for a program of preventive medicine within the plant. The physicians assigned to both services utilize the same dispensary for ambulatory care and medical examinations, and they work closely together. Thus, there has been created a unified program in which a group of physicians assumes responsibility for all of the medical needs of an employed population and the families of the employees, the costs being jointly shared by the employer and the employee under a prepayment or insurance system. Such a program approaches an ideal arrangement since it embodies the major principles of group practice, pre-payment and single responsibility. Credit for the existence of this program must be given to the enlightened attitude of the employer, favorable social legislation, the high caliber of the medical staff and last, but not least, the outstanding ability of Dr. Burger, the Father of Industrial Medicine in the Netherlands.

Small Plant Programs. Three types of small plant, or interenterprise, programs were studied in Holland: the coal mines, mixed industries in Dordrecht, and the Philips program for its smaller factories.

There are 16 coal mines in the southern part of Holland, all located in a relatively small area in the neighborhood of Heerlen, near the Belgian border. Some of the mines are owned and operated by the government and others are privately controlled. All 16 of the mines have joined together in an industrial health program which is directed by Dr. Koopmans, an able and energetic physician who received part of his training under Dr. Burger of the Philips Company. The headquarters for the program is located in Heerlen.

The major occupational health problems in coal mines are, of course, trauma and pneumoconiosis, and it is with these that the Heerlen

program has shown primary concern. In one of the local hospitals, a special accident ward is maintained and staffed by the mining interests. All facilities for handling injured workers are provided, and a highly qualified orthopedic surgeon is employed to care for patients from the mines. First aid and rescue work is well organized through a central accident service with branches in each of the mines and with close liaison with the hospital.

The coal mine program also has a central x-ray service which uses 45 mm. photoroentgenography. A full-time chest specialist is employed for this work. The x-ray service includes a pre-employment chest x-ray examination on all new employees, and an annual examination for all those employed. Cases showing suspicious pulmonary lesions may be x-rayed more frequently. Miners are not necessarily removed from the pits at the first sign of pulmonary fibrosis. The decision on this point depends largely upon the age of the miner and the character of the lesions. Young workers who show early lung changes after a relatively short period of underground work are removed from further dust exposure. Older miners who develop evidence of beginning pneumoconiosis after many years in the mines, and whose lesions progress very slowly are usually permitted to continue at their jobs. Dr. Koopmans believes that in such cases the disease progresses at about the same rate, regardless of future occupational activities, and that the miner will generally die of a cause other than pneumoconiosis. This policy would probably not be followed were it not for the fact that dust control procedures, wet drilling and ventilation, are well carried out.

The Dordrecht Industrial Health Service embraces 13 plants with a combined employment roster of about 7,000 workers. The plan was organized and is directed by Dr. van Dyk, another former pupil of Dr. Burger, and an enthusiastic young assistant, Dr. van Leeween. The central dispensary is located in space which is rented in one of the larger participating plants. It provides a waiting room, offices, examining rooms, x-ray unit, and laboratory with the necessary staff. A full range of services is offered to the participating plants, including all types of examinations, first aid and minor treatments, regular plant inspections and control of sickness disability claims.

Since all of the plants may not utilize all of the available services, they do not all pay at the same rate. Each participating plant pays a rather nominal annual "membership" fee, plus a per capita charge for each employee on the payroll. These payments cover the first aid and plant inspection services, but there are additional fee-for-service charges for each preplacement, periodic, and "control" examination. The average total payments amount to about 0.3% of the payroll. It appeared that the services provided were of the highest quality.

The Philips program for its smaller plants cannot be considered a true small plant program, since some of the installations are fairly large, having 500 or more employees. In addition to the main works in Eindhoven, there are 14 smaller installations in various parts of Holland. One full-time physician is employed to supervise the industrial health activities in these 14 plants. Because of the small size of the country it is possible for him to visit each factory every two to three weeks. In some of the plants a full-time nurse is employed and in most of them the services of local physicians are used on a part-time basis. The principal job of the visiting industrial physician is to supervise and coordinate the work of the local part-time doctors. One of the plants, in which fluorescent lamps are manufactured, has an elaborate preventive program including weighing and vital capacity testing every three weeks, and chest x-ray examinations every three months.

By way of conclusion it may be mentioned that a study of industrial health practices and social legislation in Europe can yield information of great value to anyone concerned with future developments in the United States.

What He Doesn't Know

WE IN THE medical profession are fully conscious of the difference between doctors. All doctors are not specialists; likewise, all doctors are not general practitioners. In industry there is a tendency to put doctors of all kinds more or less in the same category of "doc." A refinery superintendent often expects an expert opinion from his dispensary physician that should, in reality, come from a university consultant. With the rapid advances that are being made in the field of medicine it is now almost necessary to catalog the efficiency of a doctor from the standpoint of what he is conscious of not knowing, rather than solely from the point of view of his academic attainments. No capable doctor of today need feel chagrined that he cannot answer a given question about one of the more recent advances. He can, however, suffer severe criticism and humiliation if he fails to acknowledge his own limitations and ask for help and guidance when such are indicated.

—From the Remarks of R. C. PAGE, M.D., at a Panel Discussion on "Medical Service at Dispensary Level," in *The Medical Bulletin*, Standard Oil Company (New Jersey), April, 1951.

"How We Can Get Better Federal Medical Services"

— The National Doctors Committee —

ROBERT COLLIER PAGE, M.D., Second Vice-President of the INDUSTRIAL MEDICAL ASSOCIATION, and Chairman of the National Doctors Committee for Improved Federal Medical Services, addressed a Rotary Club Luncheon, at Atlantic City, New Jersey, April 25, during the week of the 1951 Industrial Health Conference, on the Hoover Commission's Report, with special reference to its medical aspects. The following is part of DR. PAGE'S address:

"The costs of Federal medical programs are running at the rate of two billion dollars a year and may climb much higher in the near future. The Veterans Administration gets by far the largest single appropriation and, hence, is an object of first concern. However, one of the most vital and fundamental findings of the Commission was to this effect: 'Five large and over 30 smaller Federal medical systems are operated completely independent of each other. They go their own ways, make their own plans, build, staff, and run hospitals and clinics with, as the Commission said, "little knowledge of and no regard for the operations of the others.' In other words, there is simply no central direction or organization. The whole thing is running on a helter-skelter basis. Moreover, the Commission found that 95% of the Federal medical effort is devoted to the treatment of disease. Only 5% goes for research. Consider the implications of this fact. We stand close to the conquest of many of mankind's most dangerous diseases. More research, undertaken promptly and pushed vigorously, might obviate the construction of thousands of hospital beds in the future?

"Now about the occupancy of these Federal medical facilities. It is important to know this because the VA, the Army, Navy and Air Force and all the others are constantly seeking funds and authorizations to build more hospitals. Fig. 1 indicates what the study showed at the time it was made in 1948. It has since been contended that the situation has changed greatly. Possibly it has changed to some extent, and we must recognize that the war situation has increased demand. Nevertheless, there are still many places in the country today where Federal hospitals are standing half staffed or half empty, or, in some cases, totally empty, while others are being built. Why?

"Not only are the Federal hospital services ill-coordinated; they run head on into conflict with the voluntary hospital services. In some sections, big VA hospitals are going up while nearby military hospitals are being shut down. Probably everyone interested knows of additional examples.

"In addition to the duplication and lack of coordination in the urban areas, the Commission found extreme dislocation in cases where hospitals were built for political considerations. The Miles City situation is only one of many. Miles City has a population of 9,184, and with a Public-Health-Service estimated need for hospitals at 3½ beds per thousand people, is already well serviced with a hospital GMS of 135 beds. There are 13 doctors in Miles City, of whom six would be unable to aid the VA hospital. The result is that the new 100-bed VA hospital has a layman manager, no medical director nor chief of medical services, and no patients. Moreover, the location of Miles City (350 miles from the nearest railroad division point) makes it extremely inconvenient for it to be reached by VA patients. At $50,000 a bed, this is an extraordinary waste. Two more striking examples. A big new VA hospital was recently opened in West Virginia with great fanfare. At last report, it had a staff of two physicians and no patients. In Dublin, Georgia, there stands a 1000-bed hospital, of which the VA is authorized to staff and use 500 beds. At this time only 300 beds can be used because of the staff problem and because transportation facilities to this installation were so poor an airfield had to be built to bring in patients. The nearest Pullman sleeper facilities are 53 miles away at Macon, Georgia.

"The Miles City cost of $50,000 per bed is the all-time high for Federal hospitals. Full allowance must be made for the fact that VA programs often call for special facilities of a costly sort. These are figured into bed-costs. Yet, the lowest Federal cost is still 33⅓% above voluntary hospitals and the average is 133% higher. Allowance must also be made for higher costs of material and labor in out-of-the-way places. One doubts that serious consideration by Federal hospital planners is given to the ordinary economies which are necessarily practiced in the construction of voluntary hospitals.

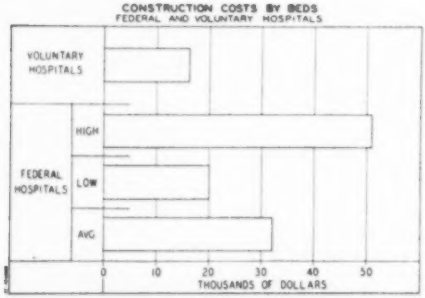

Fig. 1.

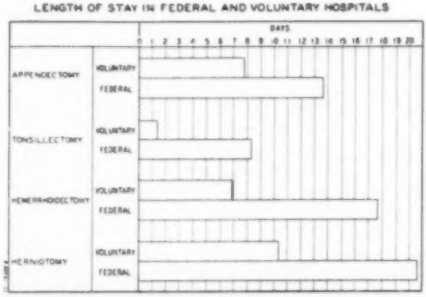
LENGTH OF STAY IN FEDERAL AND VOLUNTARY HOSPITALS
DAYS
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
APPENDECTOMY
TONSILLECTOMY
HEMORRHOIDECTOMY
HERNIOTOMY
VOLUNTARY
FEDERAL

Fig. 2.

"Fig. 2 is dated 1949 and represents the Hoover Commission's Task Force findings prior to the administrations of Drs. Hawley and Magnuson. These two medical directors were able to reduce the time spent in the VA hospitals appreciably; however, the over-all figure for Federal medical services is not much improved. The result of this deficiency tends to aggravate artificial shortages of beds in some areas which the Federal agencies construe as justification for building more hospitals. This type of shortage is also partly responsible for the VA having to farm out nearly 4,000 service-connected disability cases to private and other governmental hospitals. The Armed Forces policy of keeping patients hospitalized until they are ready for active duty represents another large part of the overly long hospitalization period. This policy should be changed by the installation of 'light duty' assignments for patients who are ambulatory, but not sufficiently recovered for full duty. Federal hospitals should not be conducted as both hospitals and rest homes."

The National Doctors Committee's primary purpose is simply to inform the doctors of the country on the facts with the hope that they will make their influence felt, in accordance with their convictions, to improve the conditions which today endanger national health and security. The Committee is set up so as to represent each of the 20-odd medical specialties and all areas of the country.

The membership includes: CHARLES FLETCHER MCCUSKEY, M.D., DONALD M. PILLSBURY, M.D., SAMUEL ARTHUR GARLAN, M.D., RUFUS B. ROBINS, M.D., MAXWELL MYER WINTROBE, M.D., GEORGE EDWARD BURCH, M.D., RICHARD HALE YOUNG, M.D., HOWARD CLIFTON NAFFZIGER, M.D., CHARLES DENTON KERR, M.D., DONALD MARSHALL, M.D., LEWIS M. OVERTON, M.D., CLAIR MICHAEL KOS, M.D., THOMAS BYRD MAGATH, M.D., LEE PALMER, M.D., GEORGE D. WILSON, M.D., JAMES BARRETT BROWN, M.D., BRIG. GEN. JAMES STEVENS SIMMONS, M.C., HERBERT SPENCER RIPLEY, M.D., ARTHUR BRADLEY SOULE, JR., M.D., RICHARD KENNEDY GILCHRIST, M.D., HENRY SWAN, M.D., CHARLES RIESOR, M.D.

The Committee has prepared a booklet which presents, in brief and interesting fashion, the problems touched upon in the foregoing quotations. The booklet is entitled "Here's How We Can Get Better Federal Medical Services." It is available at $1.50 per 100 from the Headquarters, National Doctors Committee for Improved Federal Medical Services, 15 West 46th Street, New York 19, N.Y.

BOOKS

Human Performance

RESEARCHES ON THE MEASUREMENT OF HUMAN PERFORMANCE, by N. H. MACKWORTH. Medical Research Council, Special Report Series, No. 268, His Majesty's Stationery Office (P. O. Box 569, London, S.E. 1), British Information Services, 30 Rockefeller Plaza, New York 20, pp. 156. Price $1.00.

BEFORE reviewing this particular item within the British Medical Research Council Special Reports, the desire is to pay general tribute to this long series of informative publications. Over the years, some of the most constructive presentations in the over-all field of public health have emanated from this source and with the widest scope and coverage. Within recent months this diversity is reflected in such titles as "Hearing Aids and Audiometers," "Studies in Air Hygiene," "Study of Vitamin A Deprivation in Man," and "Observations on the Pathology of Hydrocephalus."

This present report, being the 268th in the series, is directed to the measurement of human performance under divers conditions of stress. This is a report by psychologists and, unfortunately, couched in such highly technical language peculiar to psychologists that reading becomes a task. Reduced to a simplicity not found in the text, it appears that the investigators recognize that many types of work performance are so exacting as prospectively quickly to bring about deterioration in performance with the inevitability of errors. Such tasks are exemplified in radar observation and acoustical detection of approaching aircraft. In this country, quite apart from the text of this brochure, the reviewer has long insisted that the work of the train dispatcher requires a degree of vigilance that may not be sustained over long periods without deterioration in accuracy.

To measure the wear and tear of vigilance exaction, the investigators, in the first major section of this estimable report, created a test clock with the hand moving irregularly over different spaces. Analogy might be found in the second hand of a watch so modified that occasionally, but irregularly, it jumped two seconds rather than the customary one. The test procedure was to establish the accuracy, under different time periods and under different environmental circumstances, with which these irregularities were observed and recorded. From an extensive and appropriate volume of work it was concluded that under some circumstances, not entirely apart from some actual work requirements, one half-hour of time fixed the period beyond which errors were prospective. Approximately the same frequency of error appeared whether observation represented visual or, instead, auditory tasks. This decline can be prevented if such work is performed half-on and half-off duty, but one single hour under some circumstances exceeds the expectancy of best performance. That monotony is a factor in this unwanted situation is reflected in the fact that a sudden telephone message in the course of the tests produced temporary improvement but not beyond the half-hour limit. Long experience at the same task does not better the situation, and any anticipated interruption, such as an expected telephone call, facilitates inaccuracy. The investigators found that the administration of benzedrene (amphetamine sulfate) favored accuracy throughout the entire two hours of certain standard tests.

The second series of investigations, entitled "Environmental Stress Tests," involved studies under unfavorable circumstances such as atmospheres containing non-lethal war gases, high temperatures, etc.

When all is said and done, this reviewer was convinced that it must be recognized there are many, but not necessarily highly numerous work tasks that may not be continued over long periods, such as an eight-hour day, without jeopardy to the objectives of the task. Therefore, apart from the exacting requirements of vigilance tasks themselves, unfavorable environmental situations augment this peril to work effectiveness.

The professional jargon of this remarkable text is for the skilled technician, but the over-all import reaches every industrial physician, industrial hygienist, sociologist, and union leader.

The President's Page

REFERENCE was made on this page last month to an intention to assign some of the administrative interests of the Association's President to certain other officers. The assignments have been made according to the plan described below. They deal with three broad fields: leadership in the activities of the American Foundation of Occupational Health; the direction of the work of the district counsellors; and the coordination of the work of the Association's standing committees.

The President's interests in the activities of the American Foundation of Occupational Health, except for those duties which he legally must perform as a Trustee of the Foundation, are assigned to DR. R. C. PAGE, who is the Association's Second Vice-President. The administrative mechanism by which this is to be accomplished is to be known as the Committee on Foundation Activities. This new committee of the Association will probably have three subcommittees. These will function in the areas of fund raising, graduate fellowships, and evaluation of medical programs in industry as these are related to the Foundation's interests. Through DR. PAGE, these subcommittees will make studies, carry on work, and provide recommendations, all for the purpose of carrying forward the Foundation as an increasingly important force in the field of industrial health.

THE PRESIDENT'S administrative relationships with the Association's standing committees are well defined through by-laws and tradition. The President appoints committees, the committees report to him, and committee members serve for the duration of a President's term of office. Administrative clarity of this order would seem on first examination to be conducive to really great achievements by the committees. Experience has shown, however, that the relationships noted tend to produce a yearly turnover of committee personnel which in turn may be associated with a lack of satisfactory direction and definition of committee functions. Committee personnel will this year be appointed only after full discussion with and general agreement among all of the officers of the Association. A full day was recently devoted to this activity at the Association's office with good results. The collective acquaintanceships of the officers brought to light an impressive list of names for appointment considerations. These have been arranged in appropriate committee organizations, and the final correspondence which will formalize the appointments is being carried on.

With the exception of that dealing with Foundation activities, the work of the standing committees is to be coordinated by the Association's First Vice-President, DR. G. F. WILKINS. Activities with highest priorities will be those dealing with re-defining assignments and development of methods of carrying on committee work. Since the committee members are approved by all of the officers likely to follow successively in the Association's presidency, it seems reasonable to expect their reappointments for at least a few years. The consequent stability of committee organizations, plus the advantages of clear definition of assignments and central coordination, may be expected to result in a satisfactory level of productivity. Not all of the committees are filled. Several places were deliberately left vacant to provide opportunities for members whose wish to participate in Association committee work is not now generally known. The Executive Committee solicits expressions of such interest which may be made directly or through the channels of component society officers or District Counsellors.

THE WORK of the District Counsellors is to be coordinated by DR. E. A. IRVIN, the Association's President-Elect. The functions of the District Counsellors have been emphasized by recent presidents of the Association. The past year of greatly increased counsellor activity was climaxed by an impressive breakfast meeting of the counsellors at the Industrial Health Conference in Atlantic City, during which the potential usefulness of a strong group of District Counsellors was sharply highlighted.

It is expected that the plan to distribute the administrative interests of the President according to the manner described will have beneficial effects along several lines. The Executive Committee members who are expected successively to assume the presidency are provided opportunities to participate through discussion as well as the discharge of responsibility in the administration of the Association's affairs. They may, therefore, be considered to be in training for the presidency. The development of agreements among all members of the Executive Committee on appointments of the Association's standing committees should insure stability in the makeup of committees with consequent opportunities to carry on long-term programs of study and work. Finally, the delegation of responsibility to a highly competent group of associates will insure better performance of the President's total duties than might otherwise be possible.

A G Hammer

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1951 Ramazzini Rendezvous

— Seaview Country Club, Absecon, New Jersey —

June 7, 8, 9, 10

MANY a true word is spoken in jest." Many a medical gem bursts from throats clad only in "sweat shirts." It has been postulated that if any august legislative body, torn by bickering and strife, such as an all-male UN, only would conduct its controversial affairs with all members starkly nude, then momentous decisions speedily would be reached.

Orator, Dr. Robert A. Kehoe, (middle) with the 1951 "servants," Dr. William J. McConnell and Dr. Anthony J. Lanza

The RAMAZZINI SOCIETY was not founded on any principles favorable to sartorial decortication, nor have the years of its life provided any reason for the adoption of this expediency. Those years of life have made the serendipitous disclosure that men apart from women, clad not necessarily in riotous disarray, meeting as a body, are well shorn of hostilities, animosities, disaffections, jealousies, and condemnations. No man, however distinguished or superior, may maintain that unhappy state when garbed in a Scotch plaid shirt, green slacks and dirty white shoes. Promptly he is reduced to the contentment of considerate simplicity. This common denominator of unaffectedness is the cherished soul of the RAMAZZINI SOCIETY. The rarest participant in a Ramazzini session is an "inhibition."

For some years the Ramazzinians in mild manner have designated themselves as an experiment in human and professional relations. That appellation now may be discarded. The RAMAZZINI

Bottom row, left to right: Clarence D. Selby, M.D.; Lemuel McGee, M.D.; Rutherford T. Johnstone, M.D.; Robert A. Kehoe, M.D.; Arthur J. Vorwald, M.D.; and William Ashe, M.D. Second row: Harley L. Krieger, M.D.; Carey P. McCord, M.D.; Willard P. Machle, M.D.; Anthony J. Lanza, M.D.; L. E. Hamlin, M.D.; and William J. McConnell, M.D. Third row: E. L. Belknap, M.D.; Dudley A. Irwin, M.D.; Adolph G. Kammer, M.D.; Oscar A. Sander, M.D.; Robert Collier Page, M.D.; and Carl M. Peterson, M.D. Standing: F. S. Parney, M.D.; William P. Yant; Frank Princi, M.D.; and Frank Ferlaino, M.D.

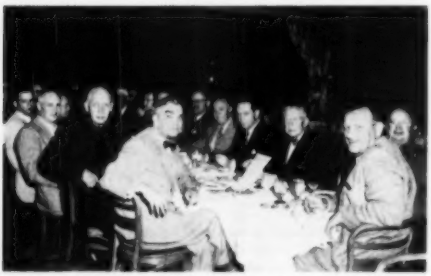
The earthquake . . .

SOCIETY is an achievement in continuing goodwill among its members. Imbued with no zeal of the missionary, the Ramazzinians, no less, hold that other small and unrelated medical organizations might profit by and enjoy similar "play pens" or "cells of hilarity."

Let those who may frown upon the hearty and the boisterous, turn to other pages of this issue, where appears the deeply sincere "Annual Ramazzini Oration," this year presented by DR. ROBERT A. KEHOE, of the Kettering Laboratory of the College of Medicine of the University of Cincinnati. This down-to-earth organization in its more somber moments addressed itself to the basic question: "What is industrial medicine?" Up came some 25 answers. Reduced to a consensus, the answer became: "Industrial medicine is the inquiry into, and the application to industrial workers and their work environments of, all the good deriving from the biologic and social sciences, for the benefit of these workers, their industries, and their communities."

The retiring servants who ably provided for the Seaview sessions of the Ramazzinians are DRS. ANTHONY J. LANZA and WILLIAM J. MCCONNELL, both of New York City. The 1952 informalities are entrusted to two new servants, DRS. ROBERT A. KEHOE and FRANK PRINCI. The fecundity of the Ramazzinians was such as to produce two new Ramazzinians, DRS. GEORGE H. GERHMANN and JERMYN F. MCCAHAN. Their influence will be added to the total in the 1952 discussionals to be held somewhere in the Cincinnati area.

The Ramazzinians, despite their roisterousness, disclaim responsibility for the minor earthquake that tremored portions of the Atlantic cost during the period of their sessions.



. . . was coincidental

SCIENCE MINIATURE

Rat Mite Dermatitis

WILLIAM G. FREDRICK
Detroit, Michigan

IN SMALLER work places on the order of restaurants, small shops and groceries—where materials and activities make occupational dermatitis little expectable—epidemics of acute skin involvment of peculiar type arise with fair frequency. In heavier manufacture the same form of dermatitis may arise but usually appears in isolated sections such as stock rooms or plant cafeterias. A common source is the bite of rat mites (Liponyssus bacoti).

During parts of the life cycle the mites are attached to the rat host. At other periods both the adults and nymphs are detached and reside in the rat nests. Both forms travel freely over ranges of many feet, and bite man. The bite itself is painful. The areas attacked characteristically are the covered portions of the body such as ankles, under brassieres, belts, shoulders, backs. The exposed face and hands are not frequently involved.

The examiner rarely observes the untouched bite. When present this reveals a small punctum, surrounded by a small hemorrhagic areola, and in turn at times a larger urticarial wheal. These may appear singly or in clusters. What the examiner usually sees is urticaria and excoriations. The complaint invariably is of intense pruritus. The needed treatment is the control of itching and the avoidance of infection. In the absence of new exposure the lesions subside and disappear in the course of seven days.

Less frequently the mites may be brought into any work place on the garments of workers exposed at home, or the dermatitis in single instances may be observed in the medical department from bites incurred at home without the necessity of mites entering the work premises.

Major control centers about the riddance of rats wherever they may be. Since the mites survive for two or more weeks apart from the host, mite control as well as rat control may be required. In part this may be accomplished by the spraying of any of the currently popular indoor insecticides containing kerosene or naphtha. Kerosene or naphtha alone, sprayed or coated, will check mite migration. Cyanide fumigation will successfully eliminate the mite.

INDUSTRIAL MEDICINE AND SURGERY

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ESTABLISHED 1932

Publisher: A. D. CLOUD

Volume 20 AUGUST 1951 *Number 8*

The Acceptance of Industrial Medicine

THE ACTIVITY area of industrial medicine embraces on a potential basis 60 million adults within the nation's population. Actually, superior industrial medical services are applied to about 15 million workers. In any case the number is not negligible. It may be contended that other forms of the practice of medicine, such, for example, as dermatology, embrace in potential coverage the entire population of the country. This may be accepted as real, but so much more the need for good dermatology. And so much more the need for good industrial medicine, whatever the number of workers . . . .

Physicians in the field of occupational health, mindful of rapid expansions in its numbers, obligations and opportunities, are well aware of the lack in some quarters of acceptance of industrial medicine as a praiseworthy component in the totality of medicine. For two decades the leaders in high places, as individuals and on an organizational basis, consistently have espoused industrial medicine. Prior to about 1930 there was a degree of acceptance, but the dominant attitude was one of tongue-in-cheek tolerance. Without relegating to any disappearing role our agricultural culture, the leaders realized, first, the undeniability that ours is an industrial culture. Then came in full measure the recognition that had industrial medicine not already existed in well-established fashion, then and there it would have become necessary to create such a branch of medicine. Indications of sponsorship of good industrial medicine in high places are legion, but only one is introduced. The American Medical Association among its few councils maintains its Council on Industrial Health. This Council is not designed for the control and regulation of industrial medicine but instead is dedicated to its growth and expansion. This acceptance of industrial medicine in upper echelons reaches down to the state medical association level, but there it sometimes terminates.

Thus the chief location of resistance to industrial medicine at the present time is within the county medical society. Since almost every physician, including those previously accepted as outstanding medical leaders, is a member of some county medical society, the assertion just made may be challenged. The opportunity for challenge is granted. But actual experience finds the nidi at that level. Before exploring some apparent reasons for these sites of reluctance, one other locus of difficulty is mentioned, although a waning one. Medical colleges of the land long have been negligent in adequate training of students to serve helpfully in an industrial culture; they have been so harried by so many items of the curriculum that just one more threatened all. To this day the recent medical graduate is woefully unequipped best to function in industrial communities. Rapidly, medical colleges are striving to right this neglect.

Why is there disdain for good industrial medicine anywhere within the medical profession? Here, disclosed by patient inquiry, are some excuses often given to justify the look askance:

1. It is alleged that industrial medicine is new.

Resistance always is directed to newness. We give up the old only with a struggle. Actually industrial medicine is not new. By some con-

cepts it was the first of the medical specialties, although indeed sluggish in the furtherance of its being. Ramazzini in the 1600's carved out industrial medicine as having especial obligations to workers. But since industrial medicine is customarily tagged as being new, let it be noted that other and newer specializations in medicine have appeared. Neatly these have been enfolded into the general pattern of medicine without aloofness. Consider roentgenology, or allergy. Newness holds no real answer.

2. It is alleged that industrial medicine has a dubious ancestry.

All medicine shares a dubious ancestry. Surgeons sprang from barbers; internists from old wives and witches; therapeutists from alchemists. None of us may be proud. The antecedents of industrial medicine are those common to all medicine and in truth common to all development of the people. What in small measure gnaws on the vitals of a few physicians is the tradition of early days that the industrial physician was the first salaried physician and thus somehow unholy. He was credited with a guaranteed income, often exaggerated, while his fellows had to struggle somewhat more. That warrants the label, "jealousy." Therein in truth is a tiny mite of explanation of current disaffection. Maybe some self analysis is in order.

3. It is alleged that industrial medicine is not one but many things. That it is too heterogeneous—industrial surgery, occupational diseases, physical examinations of the healthy, industrial hygiene, preventive programs, interrelations with safety engineering, with employment procedures, job selection, and such . . . .

Industrial medicine accepts the charge. It is all true. That is what makes industrial medicine a specialty. A real spot of tenderness in the dissenter derives from his meager familiarity with industry's 3000 occupational diseases and their precise causes. He is little at fault. He was never trained at his college or hospital. The dissenter, confronted with his own incapacity, acquires inferiority. The industrial physician is not superior. He merely tills a different patch of land. Greatly would his duties be made lighter if the dissenter were more familiar with industrial medicine's patch of land.

4. It is alleged that industrial medicine is too close to public health.

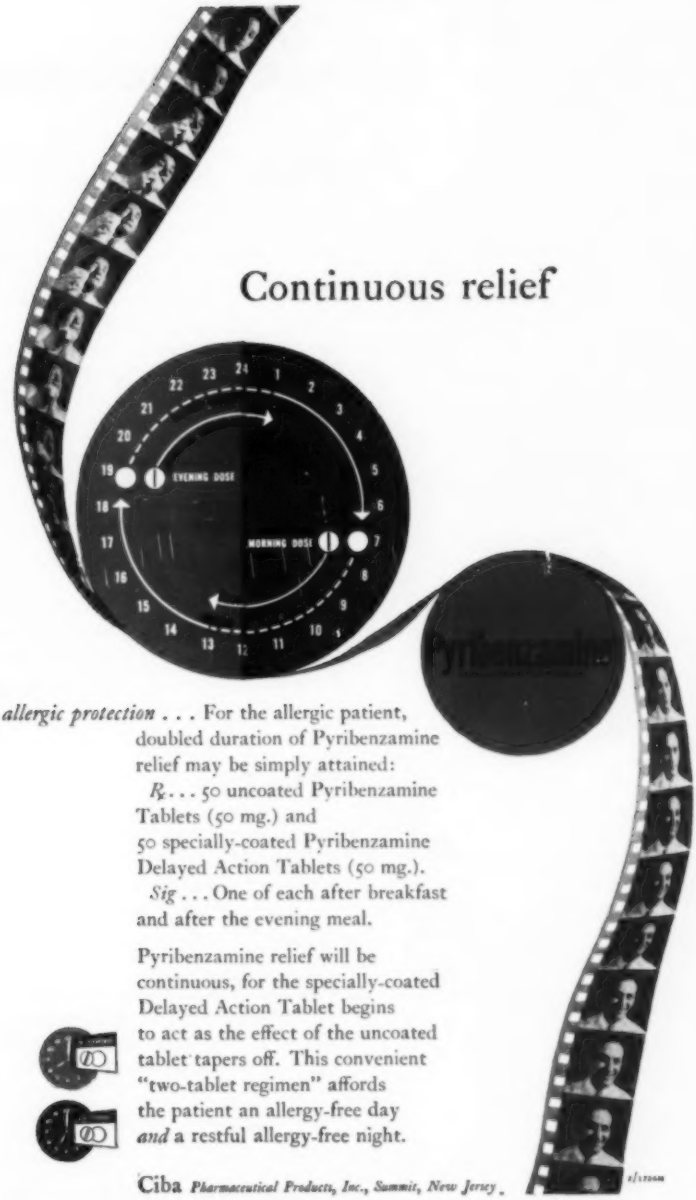
One of the mysteries of medicine is the deeply imbedded distrust of even the medical student in preventive medicine and public health. It exhausts explanation. Public health is no more accepted beyond lip service than industrial medicine. The kernel to this, and in error, is the subconscious fear that somehow public health measures will make all medicine an unnecessary and vanishing art. That flattery is undeserved. The truth is that public health measures have so conserved human life that over-population has become the world's major problem. Public health has provided and not destroyed the physician's busy life. Industrial medicine is foremostly clinical in its day-by-day enterprises, but it does have its public health and preventive medical ramifications to which perforce it will continue to adhere as an essential part of a good program.

5. It is alleged that industrial medicine tends to destroy relations between the family physician and the family.

The industrial physician has only one objective in his relation to workers—the maintenance of a work force sound in body and mind, capable of performing acceptable work, unharmed by any work process, and contentedly adjusted to work requirements and the work environment. In this laudable objective the family physician may be a staunch ally. In turn, the industrial physician is the ally of the family physician. Apart from abnormal states traceable to work as the cause, industrial medicine beyond the point of diagnosis and emergency matters assumes neither responsibility nor right to manage diseases or trauma of non-occupational origin. The worker impaired by these is just as hampered at work as though injured on the work premises. The industrial physician's concern is genuine, but betterment must derive from the family physician. As a result, the industrial physician's detections of ill health provide a continuing flow of items to the family medical adviser where they belong. A cordial alliance is most desirable and widely exists.

Clearly all this reflects only the lack of a meeting of minds. On the basis of facts, these ancient prejudices readily may be dissolved.

What is the answer? The American Medical Association through its far vision and through its Council on Industrial Health has allotted to itself the furtherance of better acceptance of industrial medicine. The chief point of endeavor is the county medical society, the country over. It is to the credit of industrial medicine that the nation's topmost medical organization has assumed this task. Industrial medicine is not without supporters. However, it may not recline in complacency. Its own duties are manifest. It must conduct its affairs in admirable fashion, must make its contributions to the medical sciences, must fit into the total pattern of medical practice in praiseworthy degree, must grow and become sturdier. Such contributions will facilitate the really complete acceptance of industrial medicine.



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NEWS, COMMENT, OPINION

SMALL plants now employ about half of the nation's working force but produce about two-thirds of all occupational injuries.

—W. DEAN KEEFER, National Association of Mutual Casualty Companies, quoted in *New York World-Telegram*, June 19, 1951.

Problems

LARGEST problems in the field of industrial hygiene now are noise and radiation.

—*Rochester, New York, Democrat & Chronicle*, May 17, 1951, quoting DR. JAMES H. STERNER.

Not Free

THE *Journal of the American Dental Association* editorially cites the fact that, after three years of socialized medicine, the British government has been forced by soaring costs to break its promise to provide complete medical and dental care paid entirely through taxation. Under a recent British government ruling, patients must pay 50% of the charge for eyeglasses and artificial dentures.

Bus Jockeys

MOST of the men behind the wheel are still courteous, and neighborly, and thoughtful. They have a hard job to do, but they've found out that treating the folks who drop their dimes in the cash box like friends, instead of strangers, makes the task a lot more pleasant. They don't get the ulcers and dyspepsia that seem to be an occupational disease with drivers in other boroughs.

—*Staten Island Advance*, June 12, 1951.

Internal Medicine

THE general trend of knowledge as we face it in the current dermatological texts, considers dermatology as it came down from Hebra (Ferdinand von, 1816-1880), as "external medicine" where things happen only on the "surface," in contrast with "internal medicine" where the depth of the human body is affected. This is a basic error, and this distorted point of view causes continuous suffering in innumerable patients. As better knowledge spreads, it will and must become apparent to all practicing physicians, that dermatology is in merely small part an "external medicine" in which —with paint brush and ointment —human suffering can be met. On the contrary, it will reveal dermatology as an integral part of "internal medicine," the skin simply the screen upon which disorders of internal organs, metabolic, endocrine, systemic infections, etc., are projected.

—From "Contact Dermatitis, Nummular Eczema, Pompholyx," by TIBOR BENEDEK, M.D., in *Urologic & Cutaneous Review*, July, 1951.

Eye Screening

SHELL Pipe Line Corporation, Houston, Texas, credits an eye-safety program with reducing its costs of eye injuries from $5,249.00 in 1946 to $958.00 in 1949—the latter figure including the cost of the corrective-protective program and the furnishing of eye protection.

—*Purchasing*, New York City, June, 1951.

Chemical Plant Safety

A. G. CRANCH, M.D., Chairman of the Safety Committee of the Manufacturing Chemists' Association, says that chemical plants are among the safest places in the country in which to work. A record low of 4.56 injuries per million man-hours worked was achieved in 1950 by the Association's member companies, which account for about 90% of total U.S. chemical production. "This accident rate is less than half the national average, and lower than that of any other industry except communications." Chemical injury rates have been substantially below the average for all industry for many years, "but chemical plants have made especially notable progress in reducing industrial injuries since 1946." The average rate for the Association's member companies has dropped 40% during the past five years. DR. CRANCH attributes this to improved safety measures adopted in the industry and to good cooperation by employees in observing safety rules and precautions.

Atlantic City Notes

DAVE BECK, Seattle, leader of the International Brotherhood of Teamsters (AFL), voiced approval of voluntary sickness insurance plans, and stated pointblank his opposition to socialized medicine.... JOHN W. CLINE, M.D., new president of

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MEDICAL DIRECTOR: Age 47; graduated University of Minnesota, School of Medicine. Experience includes seven years, Instructor, Preventive Medicine and Student Health; University of Minnesota; seven years, Director, Student Health, large State University; three years, Surgeon, Public Health Service; several years private practice. Prefers mild climate; Available 60 days.

MEDICAL DIRECTOR: Age 51; graduated, Jefferson Medical College, Philadelphia. Experience includes about 15 years, private practice of medicine. Three years, Staff Physician, large chemical company. Three years, Medical Director, one of America's largest chemical companies. Interested in atomic medicine. Immediately available.

MEDICAL DIRECTOR: Age 39; graduated, Wayne University, School of Medicine. Irish-Dutch; about six years experience as industrial physician and surgeon. One year, Assistant Medical Director, large automotive manufacturing. Available immediately.

ASSISTANT MEDICAL DIRECTOR: Age 27; graduated, Southwestern Medical Foundation, Dallas. Excellent surgical residencies and several years private general practice. Available immediately.

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the A.M.A., mentioned in his inaugural address: "....no health crisis or medical emergency exists in this country," but the real danger is in the double threat of war abroad and loss of freedom at home. Constant vigilance is necessary to oppose socialistic schemes....DOCTORS from Harvard described a method of adding fats, sugars, and proteins to intravenous feedings. They stressed the need of developing fats that will maintain their caloric and safety factors despite heat, cold, time, and humidity, thus allowing storage and shipment....ROBERT LEVY, M.D., of New York, objected to over-regimentation of heart patients. He approved moderate smoking, leisurely, brief exercise, air travel, regular work in a light category, and a lighter diet. DR. LEVY criticized science writers and popular magazines for reporting unproved theories of heart treatments....FAVORABLE reports of a new rheumatism treatment were heard at the American Rheumatism Association. THOMAS M. BROWN, M.D., of George Washington University, discussed research which, he said, linked rheumatism to a microbe.

—*Jackson County Med. Soc. Bull.*, June 16, 1951.

Vision Conference

RUTGERS University is planning a two-day occupational vision conference November 1 and 2 in Atlantic City. The program will emphasize the importance of good vision to high industrial efficiency. Attention will be focused upon the new concepts in lighting, functional color for better safety, occupational vision hazards, occupational eye injuries, relation of visual efficiency to motion and work, and establishing a workable visual program. Management leaders, personnel directors, safety engineers, industrial nurses and physicians, plant ophthalmologists and optometrists of the state are being invited. Among those scheduled to address the conference are DR. L. H. WHITNEY, Medical Director, Bell Telephone Company of New Jersey; and COMDR. R. R. SULLIVAN, of the Bureau of Medicine and Surgery, U.S. Navy; and the NEW JERSEY ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS is one of the organizations cooperating in developing the conference.

—From *Bayonne, New Jersey, Times*, June 14, 1951.

On the Rand

A RECOMMENDATION that provision should be made under the Silicosis Act for compensating miners showing serious pulmonary disability in the absence of signs of silicosis, is made in the report of the Commission of Inquiry into the occurrence of certain diseases attributable to the nature of employment in mines. The Commission has been impressed by the fact that some miners suffer from a severe degree of respiratory disability in which x-ray findings give no clue to the underlying cause. In some cases miners apparently not suffering from silicosis in any stage display markedly distressing respiratory embarrassment. Medical evidence describes this complaint as being "closely associated with dyspnea and cough, to which type we are

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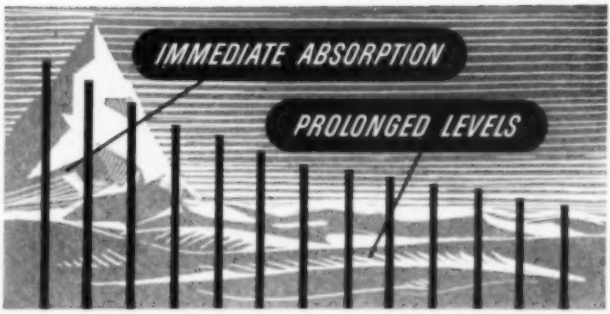
moving on the Rand as the probable prevalent type in the future." The Commission said that conditions generally in the mines had not deteriorated during the previous 10 years, while in a number of instances an appreciable improvement had occurred. The report stated that in a great many mines there had been a marked increase in the volume of air sent underground for ventilation purposes, and the quality of the air had been improved. The Commission considered that the institution of a contributory pension scheme for daily paid employees would go a long way to alleviate the position of employees who became incapacitated. The Commission also recommended that the Silicosis Medical Bureau be reorganized, such reorganization to include facilities for observation in hospital and the services of consultant physicians and the provision of necessary equipment.

—News Item from South Africa.

Health Foods

IN DEVISING formulae of drug preparations, preparing label and literature text or checking advertising copy for our clients, we are often confronted with the information that the claims made for so-called *health foods* in particular, exceed those which we recommend as factual, safe and non-violative. Frequently we are asked, if health foods are subject to a special dispensation and therefore are allowed a greater latitude than other drugs. How, we are asked, may the protection given to health foods, be extended to regular pharmaceutical preparations and cosmetics? The fact is that health foods must conform to the provisions of the Federal Food, Drug, and Cosmetic Act; many are special dietary foods, others are frankly drugs or pharmaceuticals. However, some of the claims and representations made by health foods, are so patently misleading, that the very existence of such claims causes some manufacturers of pharmaceuticals to become bolder in their own labeling and advertising. Among examples, a certain health food product containing wheatgerm, aminoacids, vitamins and minerals, is advertised to be non-fattening product and *not a drug*. The character of a preparation which must be labeled as a special dietary food is not accurately described as being non-drug, nor is wheatgerm non-fattening, as its caloric value is high. Other examples: the presence of yoghurt in a tropical preparation does not—contrary to implication—confer youth, health, or longevity. Neither figs or dates, nor yeast or soya is nature's diet. Nor is the emphasis warranted on the presence of a minimal quantity of vitamin B_{12} in a regular multi-vitamin preparation. News has just come to hand, that in his induction address as Commissioner of Food and Drugs, Mr. Charles W. Crawford has excoriated "diet quacks" and promoters operating on the fringe of propriety, who with half truths, implantation of fear and fallacious arguments



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create zealous food faddists. Some of the nutritional products sold by these fringe operators were mentioned in the first part of this comment. It is not a matter of *believing in* good nutrition with which rhetorical phrase these people appeal to consumers. But it is a matter of distinguishing the tenets of good nutrition from the questionable efforts of the fringe operators, who under the guise of nutrition stimulate the sales of questionable products by fear and fancy, not by fact. There is a place for special dietary, or supplementary foods but none for modernized versions of *Kickapoo Juice*.

—From the *Monthly Bulletin of Di Cyan & Brown*, June, 1951.

Pennsylvania

THE Pennsylvania Bureau of Industrial Hygiene, of which DR. JOSEPH SHILEN is Director, is comprised of industrial physicians, industrial hygienists, chemists, laboratory technicians, dental and nursing consultants, x-ray technicians and other technical and non-technical personnel. The mobile unit of the Division of Air Pollution Control is a complete laboratory on wheels, for on-the-spot checks of atmospheric pollution. Meteorological instruments for the compilation of weather data are included as part of the equipment, as is a Thomas autometer for the continuous measuring of concentrations of sulphur dioxide in the air. A recently initiated activity of the Bureau is the Environmental Cancer Section, which is making an occupational statistical study of all male cancer deaths in Pennsylvania during 1947. This work is the outgrowth of a belief that many occupations present the hazard of exposure to cancer-producing agents. A large Littrow spectograph was added to the laboratory equipment last year. This can measure and identify minute quantities of toxic materials in samples collected. Annual report figures for the Industrial Hygiene Bureau show that 11,080 plants employing 1,413,005 workers were serviced during 1950. Chest x-rays totaled 19,474. Twenty-six investigations of air pollution were made.

—*Philadelphia Enquirer*, June 3, 1951.

Berylliosis

SUCCESSFUL application of the new drugs, ACTH and cortisone, in retarding the deadly effects of a new pulmonary chest disease, chronic berylliosis, was described recently before the American Association of Industrial Physicians and Surgeons by DR. H. E. TEBROCK, of Sylvania Electric Products, Inc. Citing chronic berylliosis as a disease resistant to most forms of therapy, DR. TEBROCK said that nearly all types of treatment have been tried in the past with improvement rarely noted. In one area, of 86 cases treated, 24 died, 31 were totally in-

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capacitated, 17 continued work on a limited basis, and there was no assurance that the remaining cases were permanently cured. The disease, which attacks the lungs and occasionally other organs, is believed to result from small amounts of beryllium, which are present in some industrial chemical compounds, entering the body and being released through the tissues in minute amounts. When ACTH was first tried, the patients showed more improvement than from any previous treatments. After several cases were treated with ACTH, it was decided to try cortisone to offset undesirable side effects from the treatment. This proved equally satisfactory, DR. TEBROCK said. "We hope to retard or prevent the progression of the disease to a more fibrotic state by the use of the drugs," he declared. "We are making no claims, but we feel that the apparent symptomatic improvement, in the sense of well-being induced by this form of treatment, has warranted its use so far." He cautioned, however, that ill effects might result from the continued use of the drugs. He said that the possibility of adrenal and pituitary atrophy must be considered.

—From "What Industry Is Doing," in *Mill & Factory*, June, 1951.

Diagnosis

WE THINK that the quality of the medical service of the Diagnostic Unit has likewise improved. It is generally conceded that improved quality is one of the advantages of properly integrated group medical practice. The science and practice of medicine have become increasingly complex. It is impossible for any one honest individual, no matter how competent and hard working, to excel in all fields. Within our own group limits, we feel we complement one another. We hold weekly staff meetings. We make frequent use of both formal and informal consultation exchange. To illustrate a formal type of consultation and also a new service, we mention Dr. Roberts' contribution. He developed a special interest in gastro-enterology while he was with the Mayo Clinic. He has recently acquired a new Cameron Diagnostic Set, and we now have the advantage of sigmoidoscopies and proctoscopies done in the office. This contributes a great deal to the self-sufficiency of our group. We rarely need to employ an outside consultant and thus we save those fees, but more important, I think, is the fact that more people will have the advantage of an examination. The mere fact that it is readily available without the necessity of extra inconvenience to the patient by having him go out will increase the quality of the work. It is well known that increased thoroughness of examination can be a mixed blessing. We have already experienced this with Dr. Roberts' specialty. I recently asked him to examine a patient for me to rule out amebiasis. He readily accomplished this objective but he made a troublesome incidental observation. The patient had papillomata of the rectal mucosa. He was sent to the hospital for an operation he

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1. Behrman, H. T., Combes, F. C., Babroff, A., and Leviticus, R.: Ind. Med. & Surg. 18:512, 1949.

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might not otherwise have had. At least he might not have been operated upon for an indefinite period, possibly never. Since the alternate course of events in such a case involves malignant transition, we hope we never know the individual answer.

—From "Diagnostic Services at 30 Rockefeller Plaza," by D. V. HOLLMANN, M.D., in *The Medical Bulletin*, Standard Oil Company (New Jersey), April, 1951.

Blood Pressure Limits

THE predominant ideas about what constitutes normal blood pressure readings have been built up largely by data relating blood pressure readings to group mortality figures. These studies have been produced mainly by the life insurance companies. We have shown that the practice of using selected group mortality to delineate what constitutes normal limits for blood pressure, cannot be employed in the analysis of the significance of the blood pressure reading in the individual case. From time to time, clinicians have pointed out the fallacy of accepting these rigid and fixed criteria to delimit the normal from the pathological. Accordingly, the problem of obtaining new limits of normal and abnormal blood pressure is paramount. We have analyzed and presented data based on 74,000 blood pressure readings, which raise the normal limits of blood pressure usually accepted today. In evaluating blood pressure readings, based on these new limits, it is to be emphasized that these readings must not be interpreted too literally. The blood pressure is only one factor to be

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considered in the determination of the clinical status of the patient and it must be evaluated in the light of the history, physical examination, eyeground changes, x-ray examination, functional tests of the heart, etc. The acceptance of the new limits may have an effect in many fields. In the medical field it may be necessary to revise much data based on the correlation between moderate "hypertension," according to the old criteria, and various conditions — for example, coronary artery disease and coronary occlusion, cardiac enlargement, arteriosclerosis and diabetes. Many of these supposed relationships are being studied, using the new limits, and will be presented at a future date. In other fields too, the importance of the new limits is considerable. At the present time, not only physicians but also laymen have become alert to the importance and significance of the blood pressure reading. In clinical practice, every physician sees many patients who are greatly disturbed by blood pressure levels which are moderately "hypertensive." With the new limits, these patients will be relieved by the knowledge that their blood pressure may be within normal limits and is not incompatible with an average expectation of life. In addition, much therapy which is being employed to try to lower

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the blood pressure of these patients will no longer be considered necessary. The application of the new limits must also have widespread effect in industrial and military medicine, and in the life insurance field. In the industrial field, many men, particularly those over middle age, who have been rejected because of so-called hypertension, as related to Workmen's Compensation, will have to be revised. These changes will mark important gains for the individual and for the community in which he lives. In the military field a number of rejectees may be considered fit for service when the new criteria are used; this will allow better utilization of our manpower. It is not at all our intention to minimize the importance of true hypertension and its complications. The effects of the malignant form, in particular, are only too well known. There must be no slackening of the effort to learn the causes of high blood pressure and to develop a means of prevention or cure.

—From "New and Old Definitions of Normal Blood Pressure: Clinical Significance of the Newly Established Limits," by ARTHUR M. MASTER, ISAC GOLDSTEIN and MAX BENJAMIN WALTERS, in *Bulletin of the New York Academy of Medicine*, July, 1951.

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All quotations from paper presented before the 144th Annual Meeting of the Medical Society of the State of New York, New York City, Section on Dermatology and Syphilology, May 12, 1950. Peck, S. M. and Michelfelder, T. J. New York State J. Med. *50*:1934 (Aug. 15) 1950.

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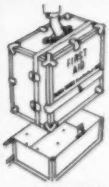

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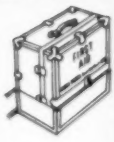

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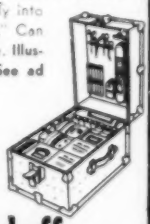

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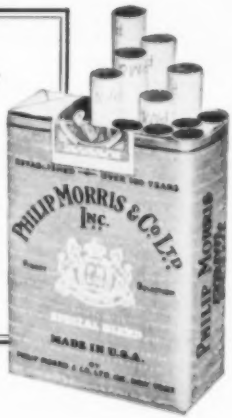

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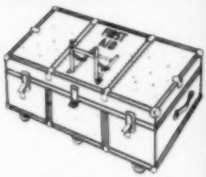

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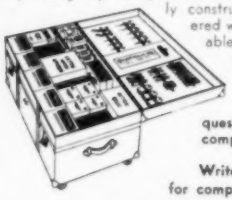

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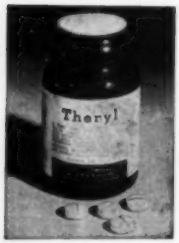

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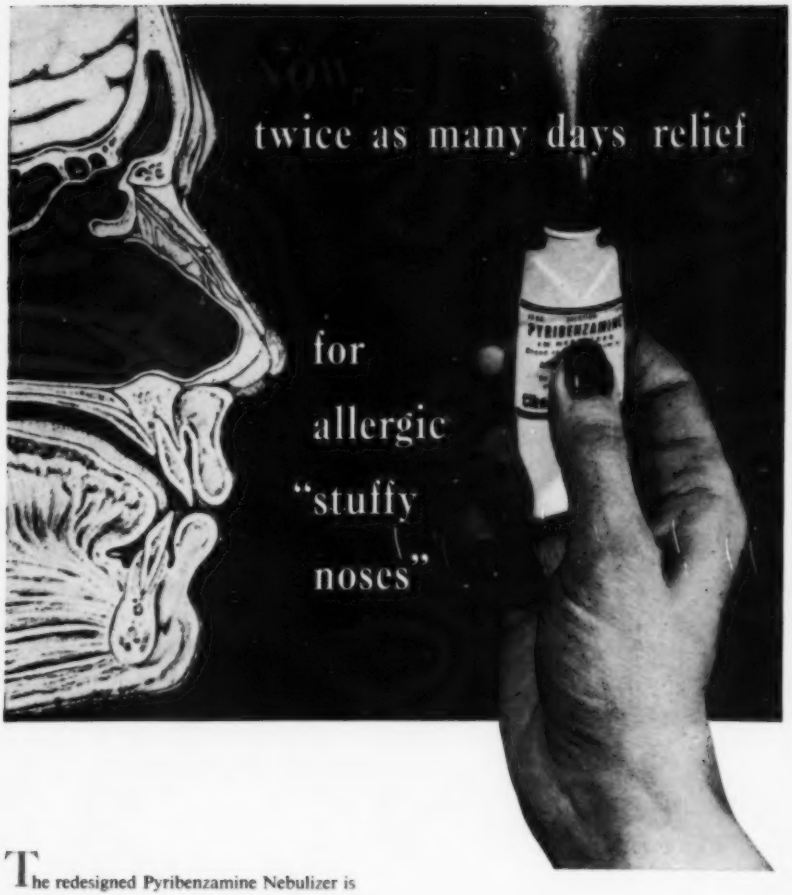

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